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VETERINARY MEDICINE

AUGUST 1945

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Sweet milk, ice cream, cheese, milk shakes and buttermilk were responsible for 40 outbreaks of disease during 1943 according to *Public Health Reports* 60:13.

Results of studies of cooperating Poultry Research Laboratories indicate that lymphomatosis occurs to a greater extent in female than in male birds.

As a result of a feeding experiment at the University of Illinois, it was concluded that breeding yearling heifers that are to be fed about five months is sound practice. Also that the severe price discrimination practiced against such heifers is not justified when the heifers are marketed by the end of the fifth month of gestation.

Studies at the University of New Hampshire indicate that hay containing the dried leaves of the sensitive fern, which is widely distributed over the eastern half of the country, is unwholesome and even poisonous, especially to old horses fed only hay. Working horses receiving grain in addition to the hay, were not affected.

County agents number 3,175. They have 766 assistants. Home demonstration agents number 2,297 with 299 assistants. The salary range for county agents in the fiscal year 1943-44 was $2,000 to $5,500 with an average of $2,880. The average salary of home demonstration agents was $2,150. The total cost of this phase of extension work was $37,800,000, of which farm organizations supplied $1,200,000 or about $1 in $31.

He who cannot remember history is compelled to repeat it.—Santayana.

Prior to the first World War, Chicago horses ate 60,000 bushels of oats a day. Now 1,000 bushels per day is more than sufficient for such as still remain in the city, leaving 59,000 bushels for breakfast cereals.

The stallions registered in Kansas in 1943 numbered 1,523; in 1944, 1,294. In the latter year the purebred stallions numbered 547; grades, 281 and scrubs 466. Approximately 80% of the purebred and grade stallions registered were of the draft type.

Halpin, of the Wisconsin experiment station, reports that a daily feeding of fresh cow manure apparently cures many cases of cannibalism in chickens. However, because experimental data is rather scanty and further because cannibalism is an uncommonly stubborn problem, Halpin warns that manure-feeding is probably not the whole answer.

By the use of basic aluminum amino-acetate which is neutral and buffers gastric acidity to pH 4 to 4.5, penicillin can be prepared for oral administration, as reported from the University of Maryland.

Trisodium citrate, sodium bicarbonate and magnesium trisilicate each have been reported as having been used as a buffer in oral administration of penicillin.

Rectal suppositories, composed of penicillin mixed with cocoa butter, when used have maintained a prolonged, effective penicillin blood level.

Army Needs 150 Additional Veterinary Officers

The director of economics stabilization recently directed that immediate steps be taken to bring larger numbers of nonfederally inspected meat producing establishments under federal inspection in order to meet the huge requirements of the armed forces. In line with this directive, several teams have been sent into the field to survey several hundred of these noninspected plants which it is believed can be made to qualify for limited federal inspection. Under agreement between the war food administrator and the secretary of war, signed in February, 1944, when the Department of Agriculture cannot supply the inspection at plants brought under federal supervision, in order to contribute to military meat requirements, the inspection service is furnished by the Veterinary Corps. It is expected that as a result of the drive now being made to bring under inspection more plants, approximately 150 additional veterinary officers will be required for the program. Accordingly, a recommendation has been submitted to the War Department to raise the ceiling for Veterinary Corps officers to provide for this additional requirement in order to maintain health standards.—*Medicine and the War.*

Five Breeds of Dogs Needed by Army for Scout Duty in Pacific

The Quartermaster Corps has revised its specifications as to breeds of dogs acceptable for War Dog training.

The five breeds now accepted are the German Shepherd, Belgian Sheep, Doberman Pinscher, Collie (farm type with medium length coat), and the Schnauzer (Giant).

Positive crosses of these breeds also will be accepted if the individual dog meets all required specifications in other respects.

Reports from the field indicate that certain breeds formerly included in Army specifications for War Dogs have proved to be unsuitable, particularly for scouting duty with American troops in combat zones of the Pacific.

All other Army specifications for War Dogs remain unchanged.

To meet current requirements, the Quartermaster Corps began an intensive three-month recruiting campaign May 1st for 1,600 dogs—600 in May, 400 in June and 600 in July.

Owners are being urged to donate their dogs to the Army to be trained for scout duty in combat zones. Inherent ability of the dog to point game for the hunter is converted by military training and utilized to hunt the enemy, to detect snipers, ambushes and otherwise unsuspected enemy presence. War Dogs are trained at Fort Robinson, Nebraska, by expert dog trainers of the Quartermaster Corps, after which they are assigned to War Dog Platoons for duty.

War Dogs are no longer obtained by the Army through Dogs for Defense, Inc., but are recruited by the Quartermaster Corps direct from the owners.

"Sulfa" in Wounds Discontinued

The Army's accumulated experience in wound management does not justify the local use of any chemical agent in a wound as an anti-bacterial agent, according to the Office of The Surgeon General. The local use of crystalline sulfonamides (sufa powder) has therefore been discontinued except in the case of serous cavities where its use, while permissible under the direction of the surgeon, is not recommended.

Anniversary of the Army Medical Department

The Army Medical Department will celebrate its 170th anniversay July 27th of this year with the realization that it has grown into the largest organization of the kind ever known and that it is giving this nation's army the best medical care that soldiers have ever received.

From its inception in 1775 shortly after General George Washington became Commander-in-Chief of the Continental Army until the present day, the Army Medical Department has made steady progress in military medicine; it has made scientific discoveries that have benefited all of mankind; but never has its progress in both of these categories been so rapid as in recent years.

The Honorable Robert P. Patterson, Under Secretary of War, in a tribute to the work being done by the Medical Department under Major General Norman T. Kirk, The Surgeon General, recently said that no army at any time in history has achieved a record of recovery from wounds and freedom from disease comparable to that of the American Army in this war. Mr. Patterson said also that the Medical Department is attaining new records in almost every field of its endeavor. He cited the Army's record of saving nearly 97 of every 100 wounded soldiers who reach Army Hospitals, the disease rate of less than one in one thousand, and similarly startling figures with reference to malaria, the dysenteries, and other diseases, showing that the Medical Department has established effective control on all disease fronts.

Fifth Army mules wounded at the front in Italy being taken to a veterinary hospital in the rear

With the Army Veterinary Corps

Lieut-Col. H. Versluis, V.C., formerly a faculty member of the New York State Veterinary College, is head of the veterinary section of the 15th Medical General Laboratory which is the American Army laboratory for the Mediterranean Theatre. Among his many duties is one analogous to "zoo keeper" for he has charge of the 1500 animals maintained by the laboratory in connection with its work of diagnosis, manufacture and research. These animals include such common ones as a couple of cows, to furnish bovine blood, chickens to supply eggs for vaccine production, goats and sheep and dogs and of course the usual laboratory animals—mice, hamsters, guinea pigs, rabbits and monkeys.

In so far as their regular duties in the laboratory will permit, the veterinary officers as an accommodation supply a veterinary service for the pets and mascots belonging to the army personnel—chiefly the aviation personnel. This brings them a great variety of ailing and injured animals including several Brazilian wild cats.

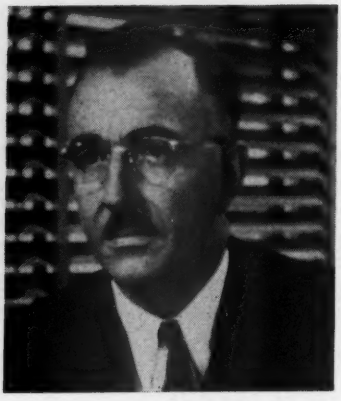
The laboratory requires 2,000 animals a year to bring the advantages of medical attention to the sick and wounded on the battle fields After the foundation stock was acquired, some of it from Italy, some from Egypt, more from Britain and some flown to the laboratory from the U. S., animals were bred as needed, which puts Versluis into the business of animal breeding to no small extent.

Capt. Glen G. Miller, V.C., son of Dr. Glen G. Miller of Denver and grandson of the late Dr. D. H. Miller, is in charge of a detachment handling War Dogs in Burma where he has been for more than a year. The detachment operates a hospital for war dogs and maintains about 200 such animals for issue to the troops as needed. The dogs are obtained by plane from a depot in India. War dogs are credited with saving lives of many soldiers in the Burmese jungle by their alertness in detecting the presence of concealed Japs.

Milk Secretion and Milking

A new kodachrome sound motion picture depicting Professor Peterson's research into milk production and methods of milking was shown at a meeting of the Chicago Veterinary Society June 26th. The picture was filmed by Jam Handy, Inc., for the Ralston-Purina Company, St. Louis, feed manufacturers. The film requires 45 minutes to run and is available to groups of veterinarians and others.

The film shows by photographs and animated schematic drawings, the development of the udder of the cow, the production of milk in the udder and the nervous mechanism and hormonal control by which the milk is released "let down" for milking. The voice in the first half of the film is that of Doctor Peterson.



© Jam Handy Corp.

Prof. W. E. Peterson, University of Minnesota

An unusual feature of the film is a sort of artificial cow made up of a detached udder, a mechanical heart and lungs and citrated bovine blood. With this Prof. Peterson was able to manufacture as much milk in seven hours as the cow from which the udder was taken produced in 12 hours. By injecting a hormone into the artificial blood stream the udder "let down" its milk.

The importance of training the heifer at her first lactation in proper milking habits is stressed. Three minutes is regarded as the proper period for milking, and sending the cow to slaughter that cannot be milked in seven minutes is advised. The effect of various methods of milking on the incidence of mastitis is discussed.

The last part of the film consists of views about the Purina experimental farms and in its research laboratories.

The Chicago veterinarians expressed themselves as well pleased with the picture.

Publicity for the Veterinary Profession

The enlarged public educational campaign to promote the interests of the veterinary profession, which the American Foundation for Animal Health is conducting under the sponsorship of the Association of Serum Producers, Inc., will be extended to the farm and livestock press, newspapers and radio stations in every part of the country. During the past several years this highly successful campaign has been limited to the cornbelt states. An added feature of the program this year will be the well-known series "What the Veterinary Profession Means to Mankind," heretofore sponsored by Allied Laboratories, one of the member companies of Associated Serum Producers, Inc.

This program of public education as to the value of the veterinary profession and the need for its services, to protect the health of livestock and assure an adequate supply of wholesome food, will reach 22 leading farm magazines, more than a thousand daily newspapers, more than 2100 weekly newspapers and nearly 500 radio stations.

Subjects of early advertisements planned for the farm magazine series include: Why America is the healthiest place in the world for livestock production; how the veterinary profession conquered cattle tick fever; livestock disease prevention and food production; the conquest of deficiency diseases; keeping devastating foreign livestock diseases from our shores; how the veterinary profession is fighting brucellosis. Plans contemplate discussing almost every phase of veterinary activity in future messages of the series from month to month. It is estimated this farm magazine campaign will reach three-fourths of all the farmers in the country.

Every city and town in the nation where a newspaper is published and where a veterinarian is located, has been checked with a view to coverage with news releases, illustrated articles, or cartoons, or with all three.

In announcing the campaign, Associated Serum Producers point out that it is a long-range project, it being the intention of the sponsoring companies to make it a continuous effort to give the public a better appreciation of veterinary service, both in the present and in the future. Outlining the reasons for the campaign, the association statement declares:

"We believe it is time that a clear, dominant voice should be raised in America to tell to the public the story of the veterinary profession. We believe it is urgent that the livestock producer be told *now* why his best safeguard in livestock raising is the skilled service of a veterinarian. We believe that there are so

many elements today seeking to short-circuit the veterinarian and his practice, that this matter of public education is the most important issue now confronting the profession and affecting its future welfare. Because we believe these things, we are launching this nation-wide, long-range campaign, and are dedicating our energies and resources to it, to the limit of our ability."

Each of the member companies of Associated Serum Producers, Inc., has a policy of sales to graduate veterinarians only.

X-Ray Discovery 50 Years Old

This year marks the 50th anniversary of the discovery of the X-ray by Wilhelm Roentgen. He called it X-ray because he could not otherwise define "this unknown quantity of great penetrating power." The discovery caused a world-wide sensation. Newspapers published fantastic stories and predictions concerning it. Some speculated it might be possible to photograph the soul and might resolve the question of spiritualism. None, not even scientific publications, foresaw more than a small percentage of the many uses to which these rays would be put in medical and other sciences and in industry.

Stilbestrol and Poultry Fattening

Caponizing would probably be an incorrect term to apply to the action of stilbestrol when administered to poultry. Stilbestrol definitely does not accomplish that on any permanent basis, at least. The drug is classed as a feminizing hormone, but accomplishes the desired results of caponizing—namely, causes a fat deposit in the breast and muscle tissue of cockerels so as to render an often stringy meat to a very choice, tender morsel.

Cornell University has found that this feminizing hormone improves the table meat qualities of even old cock birds.

Apparently including the hormone in the feed has not been as satisfactory as inserting a small pellet of the hormone underneath the skin. The use of the drug for only a two-week fattening period has given wonderful results. As time reduces the price of this hormone—and research develops its best use—it is expected to have commercial applications.—*Wisc. Dept. Agr.*

In this connection Dr. F. B. Hadley, Madison, Wisconsin points out that a pellet of stilbestrol deposited under the skin of fowl may not all be absorbed within the two-week period mentioned and the residual portion would accordingly be left in the carcass to cause a possibly unpleasant reaction on the part of the consumer.

Equine Encephalomyelitis 1945

A summary of the data received on infectious equine encephalomyelitis by the federal Bureau of Animal Industry is as follows: Total number of cases to June 29th, 135 in 11 states. The number of cases in the various states reporting the occurrence of the disease is: Iowa 54, Illinois 21, Oklahoma 17, Nebraska 12, California and Utah 9 each, Indiana 6, North Carolina 4, and South Dakota, Oregon and Idaho one case each. The number of cases recorded in the first report of the Chief of the Bureau last year, was 295.

Cattle-Liver-Fluke Control on Area Basis

The control of cattle liver flukes by the synthetic drug, hexachlorethane given as a drench, has proved so successful in individual herds that stockmen in Duchesne and Uintah counties in Utah are now applying the treatment on a countywide scale.

As a result of benefits such as more rapid gains, earlier maturity, and fewer death losses, cattlemen now plan to treat their animals regularly two or three times a year.

In the past the principal methods of control were attempts to drain wet pastures and the use of copper sulfate to poison the snails in which the parasite spends part of its life cycle. Although these methods were fairly successful in some cases, drenching with hexachlorethane is more effective and economical.—*U.S.D.A.*

Extreme Rarity of Cancer in Cows' Udders Baffling

Though admitting that the evidence furnished by 13 million bovine udders can't be wrong, scientists of the U. S. Department of Agriculture are baffled by the seeming nonexistence of cancer in this gland of cattle especially since cancer is common in the corresponding glands of human beings and various animals. The absence or extreme rarity of cancer in cows' udders is still more surprising because that organ is unusually large and highly developed functionally. It is also exposed to irritation and bruises.

One survey, a number of years ago, included about 13,000,000 bovine carcasses, none of which had a cancerous udder. Last year post-mortem examinations by the federal meat inspection service disclosed that 32,709 cattle were affected with some kind of tumor and laboratory studies showed that many were malignant but no cases of cancer of the udder were found. As yet there has been no satisfactory explanation for this condition, in scientific reports on the subject.—*U.S.D.A.*

Smithfield—Mart for World's Meat*

By W. H. HOLTON
London, England

On the edge of that part of London which was the site of the City in olden days, lies Smithfield Market, a range of market halls covering ten acres. It is the largest meat market in the world, and is linked up by road, rail and river with not only every part of Britain, but every port in the two hemispheres.

Before the war four-fifths of the mutton and lamb from Australia and New Zealand, half the frozen beef from those countries and half the meat from South America, was handled there. These, with supplies of meat and poultry from other countries, made an annual total of nearly half a million tons, of a value of over $140,000,000. Forty per cent of the people in Britain received their meat through the wholesale dealers in Smithfield.

The cold storage of the premises has a capacity of 15,000 tons or, say, 600,000 carcasses of mutton.

SMITHFIELD MARKET IN 1855

About the middle of the 19th century, John Gamgee, a brilliant British veterinarian, was endeavoring to persuade the government to institute veterinary police measures to stop the slaughter of diseased animals for food; it being "the settled policy at that time to slaughter every diseased animal that could be delivered to the butcher before it died."

In 1863 Professor Gamgee issued a call from Edinburgh for the first International Veterinary Congress, to consider the problem of rinderpest. When the disposal of the carcasses of diseased animals was under consideration by the Congress, Gamgee was asked what they did with them in England. Thinking of Smithfield he replied, "Eat them"

The control of the market facilities in prewar days was a triumph of organization. Four hundred 4-ton trucks could be backed in for unloading at one time and all could be unloaded within an hour by the 1,700 porters. On one occasion 5,000 tons of produce were received, sold and dispatched in one day.

In the market halls the shop frontages aggregate nearly two miles, while the meat hooks, placed end to end, would total 45 miles. These halls were never shut, night or day.

On the outbreak of the war the whole system of distribution was decentralized because of the risks of air attacks. Depots were scattered all over Britain, but the same efficiency was maintained as at Smithfield. Not once has the meat supply of Britain failed.

The wisdom of this decentralization was soon apparent. In common with the rest of the City of London, of which a third was devastated by enemy aircraft, Smithfield received its quota of bombs. Some of the empty halls were partially wrecked, while other buildings suffered severely from fires due to incendiaries. One eventful night only the swift action of the firefighters saved the whole range of buildings from destruction.

Like the majority of London's markets, Smithfield has its roots buried deep in the history of the old grey City. More than 800 years ago there was a patch of common land just outside the City walls known as Smoothfield. It was the favorite resort of the citizens for their evening walks; the young men used it for their sports and games, while any city event requiring more space than the city's narrow streets took place there. There were archery butts and tilting rings, and it was the scene of much pageantry.

*Few American veterinarians have visited London without making a trip to Smithfield Market. For half a century Smithfield was the most important market in our export meat trade. Its influence on the development of the livestock and meat packing industries in the United States has been large. Following World War I much of the Smithfield trade of our packers was lost to Danish, Dutch and Polish meat exporters.—Editor.

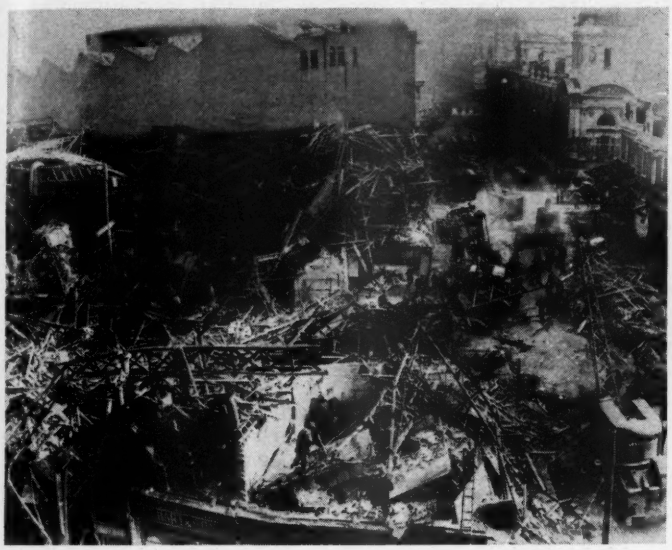
In 1123 Rahere, a jester at the King's court, returned from Rome with a vow that he would build in London a priory and hospital dedicated to St. Bartholomew. He obtained permission from the King to build on the edge of Smoothfield and, more important still, to hold a fair on the field, levying a toll on the visitors to pay for the buildings.

So was born St. Bartholomew's Fair, which lived for over seven centuries. In a generation it grew to be one of the biggest fairs of medieval Europe, trading in cattle and cloth. Buyers and sellers came from all over Europe, the King giving them his safeguard in those dangerous days—"firm peace to all persons coming to or returning from the Fair."

But Smoothfield saw grimmer sights than fair booths. Two hundred years after Rahere some thousands of peasants in revolt against unjust taxation marched to the field, led by Wat Tyler. Richard II, King of England at that time, rode to meet them. Wat Tyler, carrying a dagger, caught hold of the bridle of the King's horse and the Lord Mayor of London, who was with the King, thinking the rebel leader meant harm, promptly drew his sword and ran it through him. The peasants, lost without their leader, were driven back into the countryside and scattered.

To this day the arms of the City of London bear a dagger in the corner to celebrate the bravery of the Lord Mayor who saved his King. These arms are engraved on the stones of Smithfield, for the City Corporation are the owners of the market halls.

Two hundred years after that the name of the site had been changed to Smithfield and there were even grimmer happenings. Smoke from Martyrs' fires hung heavily over the fair ground. During the four years ending in 1558 two hundred people perished in the flames for their religious opinion. Today in an arch of St. Bartholomew's Hospital is a memorial to these "servants of God" who died for their belief.



SMITHFIELD MARKET 1945
This view shows Smithfield Market shortly after a V2 rocket bomb struck it in the final weeks of the war. Civil Defense rescue crews are shown already at work to release those trapped in the wreckage. In London, 80,507 persons were killed or hospitalized (about 40% killed; 60% hospitalized) as a result of bombing, during 5½ years of war. In all of Britain 200,000 houses were entirely destroyed, 250,000 were rendered uninhabitable and an additional four million were damaged by bombs. This number exceeds one-third of all the homes in Britain at the time the war began

During the following years the character of English life began to alter and the fair, too, changed. Although great numbers of cattle and sheep were still sold there, and it continued to be a cloth and woollen fair, it developed more into a peddlers' market and a pleasure fair.

With the growth of London, streets began to stretch out beyond Smithfield. The field that Rahere knew was covered with rows of houses. The cattle market with its shambles and slaughter-houses grew into an intolerable nuisance, and Parliament intervened.

About 80 years ago they decided that St. Batholomew's Fair had outlived its usefulness. Peddlers and pleasure seekers were banned from the site. The live cattle markets were moved further away from the City, the slaughter-houses closed and, in 1868, the Corporation of London erected and fitted up market halls at the cost of two million pounds for the sale of meat. These buildings since then have been considerably enlarged, some quite recently.

What will happen after the war is not settled. It is, however, unlikely that the pre-war system, which functioned so effectively, can

be improved upon. Buyers and sellers do not expect a great change, there being no more conveniently placed market in London than Smithfield.

Before the war Americans sometimes wondered why their bacon had, to a certain extent, been displaced at Smithfield by Danish products. It is true that the market in "sides" had certainly dropped. But at holiday time, especially Christmas, there was a brisk trade in American hams and "picnics." The demand for American "sides" had fallen partly because of the quota imposed on such imports and partly because American bacon was too fat for British tastes. American "sides" had heavy hocks; this is the cheapest part of a "side," so from the salesman's point of view it was less profitable when it came to cutting up.

Sir James Parr, High Commissioner of New Zealand, inspecting premium lamb carcasses at Smithfield Market. All illustrations in this article are from official British photographs

On the other hand the Danes and the Dutch cultivated their bacon for the British market, breeding pigs with smaller hocks and better balances as regards lean meat.

With Lend-Lease, American "sides" came into the market again at the beginning of the war; that market has now fallen as far as "Smithfield" is concerned—possibly such supplies have been devoted to Russia or the liberated countries. Bellies of pork, however, are being received in quantities and form about one-tenth of the British bacon ration. But, because they are so fat, they are not popular.

There is, however, a tremendous boom in American cooked meats such as Spam. Provided these are marketed at an economical price, there should be a good British demand for such goods when trade is again normal.

What to Do with 15 Billion Pounds of Extra Milk Production

The dairy industry is facing a tremendous over-production in the immediate postwar years. Unless effective measures are employed to increase the normal use of dairy products, the industry must experience severe losses. Fortunately, there are great opportunities for increasing the consumption of dairy products. Increased consumption sufficient to include all the prospective increased production is easily within the possibilities. A material increase in the consumption of dairy products depends very largely upon just three measures: (1) Supplying those products at a price the public is able and willing to pay, (2) supplying a safe palatable product and (3) acquainting the public with the nutritive value of dairy products.

Better breeding and more rigid selection of cows for high production and improved methods of processing will lower the cost of production and economical methods of distribution, particularly of fluid milk, will place the cost to the consumer well within the range of what he is willing to pay for a product that is safe and palatable. That is, assuming fair general economic conditions prevail.

The greatest opportunity for increasing the use of dairy products by the public, lies in supplying it safer and more palatable products. Too many milk-borne epidemics are reported to permit of complete confidence in the safety of the product, but lack of palatability is the greatest obstacle to greater consumption of dairy products. It is particularly influential in inhibiting wider use of fluid milk and cheese.

The large per capita consumption of dairy products in the armed forces has been much commented upon, often with astonishment. There is no mystery about it. The military forces are supplied a more palatable product than is available for civilians. It has not been published but it is true that, at stations enjoying an exceptionally high quality of fluid milk, the consumption would have been at least twice as great as the amount provided in the ration had it been available.

Greater safety is attainable practically only by more general pasteurization, particularly of fluid milk and the milk from which cheese is made. Improved palatability depends chiefly upon improved sanitation on the dairy farm and in the manufacture of some dairy products, particularly cheese.

The Veterinary Officer of Health*

This paper deals with the work of the veterinary officer in the sphere of public health and preventive medicine, the need for a post-graduate course in public health for veterinary officers, and a syllabus for a veterinary diploma in public health.

In the Union today we have 41 full-time and 82 part-time municipal health officers, whereas there are only 11 full-time and about 6 part-time veterinary officers in municipal employ.

This can hardly be called an adequate representation of a highly scientific body of men, whose teaching renders them eminently suited to this important branch of work. The teaching of veterinary science lays an excellent foundation for an efficient public health superstructure; but the building has never been completed. The veterinary officer has the most detailed knowledge of milk in its production, but he is not taught very much about the manifestation of milk-borne diseases in man, or the legislation and administration governing diseases spread from animals to man.

Nor is he taught how to bring to bear his knowledge on the preventive side of medicine. There is no such emphasis in his teaching. And that is why so valuable an ally is partially lost to public health. The few veterinarians who have been interested have done excellent work. Any municipal health officer who has had an enthusiastic veterinary officer in his team knows this very well.

The South African Medical Corps has had an excellent opportunity for close collaboration with veterinarians in the Union Defense Forces. This has been a great adjunct to military preventive medicine, and has had a beneficial effect on the health of the soldiers, and incidentally, the public in general. Let us consider milk supplies alone and see what this public health team has done in the past two years.

Milk and milk-borne diseases are amongst the most important and pressing public health problems. The literature is full of descriptions of milk-borne outbreaks of infectious disease. The Bulletin of Health Organization (League of Nations) of June, 1937, devotes almost an entire publication to this world-wide problem. South Africa in the past few years has had no less than four severe outbreaks of typhoid fever, with high mortality rates, due to milk. These outbreaks have been so striking that the public demanded to know the cause, and called for a thorough investigation. But what about the other group of intestinal diseases: gastro-enteritis, the dysenteries, and the so-called summer diarrheas?

What part does milk play in the infantile mortality rates, which are very largely associated with gastrointestinal infections? There is no doubt that very many of these diseases are spread by infected milk, and enteritis in babies is so common that it has almost been accepted as inevitable!

Undulant fever is more prevalent in South Africa than is generally known, and cows' milk is the chief source of infection. Septic sore throat, scarlatina and even diphtheria cases may have their origin in infected milk. All this has been proved over and over again. It is obvious that there is a great deal of work to be done if we are to make use of the available knowledge. And it is also obvious that the work can only be done by a combined team of medical and veterinary and health inspectors.

For this reason, early in the war the Defense Medical and Veterinary Departments together initiated a campaign for "safe milk." This included every aspect of production and distribution, from the clinical examination of cows to the supervision of the delivery of the milk to the consumers. Pasteurization plants were inspected and supervised The program had as its basis, education and propaganda amongst producers of milk, distributors of milk and managers of pasteurizing plants.

The same co-operative effort in the Union Defense Forces was brought to bear on the control of meat and meat products before delivery to the various camps.

Wherever possible veterinary officers carried out ante- and post-mortem examinations of animals slaughtered for military use. In addition, public health education and propaganda were brought to a number of new areas in the Union, so much so that many public health improvements were effected in abattoir construction and butchers' shops throughout the country. In some places completely new and up-to-date abattoirs were erected under the guidance of veterinarians.

In various other ways, from the supervision over canning, canned products and fresh perishables, to the grading of other foodstuffs, the veterinary officer has played his part in the war.

In civil life, in public health departments the field of the veterinarian has, so far, been

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very limited. In most instances he is just employed at the abattoirs, but he also is sometimes in charge of milk supplies.

There can be nothing more soul-destroying for a scientifically trained individual than to spend all his time at an abattoir making regulation cuts into carcasses, or watching others making them. Nor is there much relief in the monotony of the life of a veterinary officer who day in and day out spends his time on purely dairy work.

There is a far greater field of activity for the veterinarian. There is a place for him in the public health world, for without his services no health department can function properly. He will always, truly enough, be the specialist on meat, meat products and dairying. He will naturally be the only person who is in a position to deal with the clinical examination of animals. His scope must, however, extend beyond this. He should be able to take charge of the public health side of markets and marketing schemes, and the control of many other perishable products. He should have an extensive knowledge of food values and dietetics. Indeed, from municipal veterinary officers in various parts of the Union, in collaboration with medical officers and agriculturists, should come the lead to this country as to what we should and could grow or produce most economically.

The veterinary officer should not confine himself only to *disease* in animals. Part of his work should be directed towards the general improvement of the breeding of animals for human food and the production of better grade beef, mutton and bacon. The production of eggs—one of the most important articles in our dietary—requires very much more attention.

The food value of milk products is undisputed, and yet most of the foodstuffs prepared from milk have received very little public health attention in regard to methods of preparation from the "food value" aspect. The manufacturing of cheese, for instance, results in a product far short in quality and palatability of that produced in most European countries. The making of ice cream, a very popular food particularly with children, needs much more supervision. The manufacturing of dried milk to provide for times when there are milk shortages or for use in areas where fresh milk is unobtainable, such as in tsetse-fly areas, has almost escaped the attention of the veterinarian.

Fresh vegetables and fruit, which are so essential to health are, on account of their scarcity, beyond the means of those who need them most. In fact, these commodities are so expensive that they are beyond the purchasing power of most people. And yet, in spite of a great deal of recent propaganda for compost making, there is still a great deal of waste manure and animal and vegetable waste products. If we are to get the best out of the soil and produce the fruit and vegetables we need at prices within the reach of all, there is much to be done.

Malnutrition is a very serious problem in South Africa and veterinarians can do a great deal to assist in combating it.

The veterinary officer should be the adviser to the housing manageresses in regard to co-operative buying of foodstuffs on a wholesale basis. He should take a very live and active interest in this socio-economic problem, which deals with the rehabilitation of the less fortunate.

Assistance in the control of infectious diseases should be part of his duties, and he should have daily information of all communicable illnesses occurring in his area. With his basic knowledge of bacteriology, entomology and parasitology, he should not require much further study to equip himself to be the most suitable person to deal with the *sources of infection* of diseases such as malaria, plague, bilharzia, typhus, dengue, sleeping sickness and relapsing fever. He should be aware, from day to day, of the incidence of typhoid, dysenteries, scarlet fever, septic sore throats and diphtheria, which might be spread by milk. He should know much more about the manifestations of these diseases in man, and he should have a thorough knowledge of their etiology and bacteriology, so that he can do his share in combating them. He could and should take an active part in all public health propaganda work.

The training of health inspectors for the Royal Sanitary Institute Certificate, which deals with instructions on the examination of meat, milk and food products, should be undertaken by the veterinary officer. Candidates for the "Meat and Other Foods" examination should be almost entirely trained by veterinarians. This aspect of training for health inspectors is very much in need of revision and supervision. The fact is, however, that there is not a single veterinary officer outside abattoirs who lectures on these subjects at any of the technical colleges where the courses are conducted. The same applies to the teaching of medical men for the Diploma in Public Health. The present arrangements provide for very little instruction by veterinarians apart from a few demonstrations at the abattoirs. The teaching of this important branch of the work should be outlined and undertaken by

veterinarians at the universities. The amount of instruction given at present is totally inadequate, and is the one part of the public health diploma course which is sadly neglected at most institutions.

In short, the veterinary officer should become as much a member of the public health team as the medical officer of health.

South Africa has never been so public health conscious as it is today. That is how it should be, because on the crest of this wave we may in the very near future progress beyond imagination in slum elimination, re-housing and health control of foodstuffs.

In this great development veterinary science has played no mean part. But it must be admitted that very few people even associate the veterinarian with public health work. The public is not entirely blame-worthy, because veterinarians themselves have not, outside laboratories, taken any great part in preventive medicine.

In this new public health development to which we all look forward, there will be far greater scope for the establishment of veterinary sections in health departments. Many new posts will be created with, it is trusted, adequate emoluments, to make them attractive enough for the right type of candidates.

The big stumbling block, however, is that the veterinary officer, like the medical man who has not taken a post-graduate course in public health, knows only a fraction, and a very small fraction at that, of what is required for this work.

Health inspectors know this only too well and it leads to difficulties in administration and inspections. Some medical officers of health have gone so far as to prohibit the veterinary officer from reporting on matters at dairies which deal with sanitation on account of conflicting reports between the veterinary officer and the dairy health inspectors.

Without adequate public health knowledge the veterinary officer cannot have the correct public health background and he is therefore unable to do his part with confidence. But this difficulty can be overcome by the institution of a post-graduates course in public health for veterinarians.

This should be a full-time course lasting at least one year, and the successful candidate should be given a diploma which could be called the Diploma in Veterinary Public Health (D.V.P.H.), and a veterinarian so qualified and occupying a public health post should have the designation, which we have coined in this paper, of the Veterinary Officer of Health.

The course which is visualized is one similar to the Diploma in Public Health for medical men. It should, however, leave out subjects which are purely "medical," like diagnosis and treatment of human beings. On the other hand it should make provision for more extensive studies in other directions, such as milk, food control, diseases which are transmissible from animal to man, control of insect-borne diseases, and entomology.

"The Importance of Veterinarians"

Last February when the North Carolina Veterinary Medical Association was holding a meeting in Raleigh the *Winston-Salem Journal* published the following as part of an editorial discussing the meeting:

It was a definite step forward in our progress toward better health for everybody when members of the veterinary profession ceased to be thought of as "cow doctors" and were recognized as one of our most valuable safeguards of human as well as animal health.

The importance of the veterinarian to the smashing of the foes of democracy is seen in the fact that less than a month after the Axis's declarations of war against America, the Federal Security Agency appointed a committee of outstanding veterinarians to serve with like groups of physicians and dentists in a joint board to protect the health of the nation throughout the crisis.

It was through the work of Gaston Ramon, a veterinarian of France, that toxin was discovered, making it possible for physicians to immunize little children against diphtheria and tetanus. Only because of this discovery can soldiers, as well as civilians in hazardous occupations, be safeguarded in advance of injury against the horrors of tetanus.

By the practical eradication of bovine tuberculosis, we now boast a dramatic decrease in child mortality and a marked decline in tuberculosis in general.

Another great contribution of veterinary science to human medicine is the control of hookworm disease—an ailment which, by robbing men of their energy, dooms whole families to lives of laziness and poverty. Not only did veterinarians discover the parasite but also the chemicals for its destruction.

Veterinarians were the first to disclose that some diseases are transmitted by insects, and soon it was shown that yellow fever was one of these. Consequently, the once-dreaded scourge has now become a rarity among mankind. It was because of this discovery that the building of the Panama Canal was made possible, for before we undertook its construction, yellow fever had forced France to abandon its attempt to cut across the isthmus.

Occupational therapy had its beginning with the veterinarians. Silicosis, a disease caused by inhaling silicate dust, is so common in some occupations that its treatment has become a medical specialty. Yet, centuries ago early Roman and Arabian veterinarians recognized the ill effects of inhaling sandy dust stirred up by horses on desert marches.

The men who fight the diseases of domestic animals, beyond a doubt, have made—and are continuing to make—a praiseworthy contribution to the health and happiness of mankind.

Observations on Sterility

By J. W. BRITTON* and C. E. HOWELL*
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RECENT investigations [2, 5, 6, 7, 8, 11] have demonstrated that barrenness in thoroughbred brood mares is due to four main causes: (1) the short breeding season and inappropriate time of mating, (2) genital infections, (3) irregularities in the estrous cycles, and (4) infertile stallions. In addition, much has been done to discover the basic etiological factors involved in the four groups and it should now be theoretically possible to increase greatly the breeding efficiency of well managed stud farms. In a previous publication the authors[1] summarized data on the duration of gestation obtained from the breeding records of the University of California Arabian Horse Ranch in Pomona. This paper is an attempt to evaluate the importance of the four main causes of brood mare sterility from these records.

Breeding Record of the Herd

The records cover the breeding history of 36 brood mares and 10 stallions at the ranch from 1927 to 1943. All mares, not thought to be in foal, were teased in pasture three times a week. Those showing heat to the teaser were brought in and bred two or three times during the period. They were then turned back to be teased again at regular intervals, until such time as they were deemed to be in foal when they were turned to pasture with the pregnant mares. A week or so before foaling, the mares were brought up to the barn to foal and, as a rule, were bred on the foal heat before being turned to pasture with their foals. All mares were under frequent observation at all times. All horses on the ranch were maintained on a good level of nutrition throughout the year.

In determining the significance of the duration of pregnancy upon the various factors influencing fertility and sterility, the average duration of gestation for pregnancies ending in each month of the year was figured for all the pregnancies in this herd as well as a large number of Arabian mares foaling in California. As was shown in the previous work[1], the duration of pregnancy is significantly affected by the month of foaling. The following are the average number of days found in the previous work and in 220 additional pregnancies: January—340, February—343, March—342, April—343, May—338, June—329, July—328, August—326, September—331, October—332, November—333, and December—335. Each recorded pregnancy in this paper will hereafter be referred to as days equal to above or below the average for the particular month involved, thus eliminating any discrepancy due to this factor.

Table I shows the breeding record of the herd. The pregnancy variation recorded in the last column shows the number of days over or under the herd average which the foals were carried. Total breeding months include all time from the first recorded breeding in the ranch records to the last foaling or the last recorded breeding whichever was latest. The months lost due to dead or diseased foals, failure to show heat periods after any regular breeding in which conception did not result, delay in the onset of foal heat beyond 30 days, heat periods longer than 12 days, or repeated breedings in more than three successive heat periods without conception were counted as abnormal months. All other time was considered normal. When a mare was withheld from service due to absence from the ranch or illness, the intervening months were omitted from her total breeding months.

A total of 791 abnormal months from all causes are recorded and of these 23.4% were from dead or diseased foals, 34.8% from failure to show heat, 14.4% from failure to show heat after an unsuccessful breeding on the foal heat, 11.7% from delayed onset of foal heat, 2.3% from long heat periods and 13.4% from repeated breedings with no conceptions. Irregularities of the estrous cycles thus accounted for over 63% of the abnormal months, whereas dead or diseased foals and repeated breedings accounted for 23.4% and 13.4%, respectively, of the abnormal months.

Dioestrum After Unsuccessful Breedings

Catchpole[3] working on the same group of mares forming the basis of this paper reported that 50% of 25 mares during a two-year period showed no heat for four to 10 months following breedings. He states that 30% of barren mares fail to show heat after breeding and considers it likely that a period of pseudopregnancy with a dominant corpus luteum is responsible. Caslick[4] estimates that 15% of barren thoroughbred mares, otherwise normal, show this irregularity. By means of vaginal examinations he has demonstrated that many of these mares ovulate as regularly as normal mares, but simply fail to show external signs of heat at every ovulation. Day[5] has postulated that a follicle matures in some of these mares, but fails to rupture and becomes cystic because of scar tissue formed as a re-

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sult of successive corpora formation. He considers that other mares either in poor condition or over-fat may never ovulate or show heat because of small follicles which come up, regress and become cystic. A final group ovulate regularly, show estrual changes on vaginal examination but do not exhibit heat on being teased. All agree that these mares tend to repeat the same irregularity year after year. A further possible cause for failure to show heat is that the mare actually conceives, is turned out as a pregnant mare and suffers from absorption of the fetus.

Twenty-three of the Arabian mares showed dioestrum after unsuccessful breedings at least once, and 11 of these repeated it from three to six times. In all, failure to show heat was the cause of the loss of breeding time in 64 cases for a total of 276 months or an average of over four months each time the abnormality was shown. The abnormality occurred with regularity regardless of the age of the mare or month or year and was of approximately equal duration during all months. Seven of the 23 maiden mares, for which complete records were available, showed this irregularity, while the other 57 cases were shown 37 times by barren mares and 21 times by foaling mares. It was difficult to determine, by teasing, when three of these mares were in heat. Five were good milkers, two were poor milkers, and eight were in poor condition. It is not known just how many of these mares would have shown estrum on vaginal examination, nor how many suffered from cystic ovarian degeneration.

TABLE I—A CONDENSED BREEDING RECORD OF THE ARABIAN BROOD MARES UNDER DISCUSSION

				Abnormal Months						Live Foals		
Mare	Total breeding months	Normal Months No.	Normal Months %	Dead foals	Prolonged dioestrum	Dioestrum after foal heat	Delayed foal heat	Long heat	Repeated breeding	Colts	Fillies	Pregnancy variation
9	72	72	100	0	0	0	0	0	0	3	3	+4
12	72	72	100	0	0	0	0	0	0	4	2	—9
17	80	79.5	99	0	0	0	0	0.5	0	3	4	—9
1	76	72	95	0	0	2	2	0	0	3	3	—5.5
7	85	81	95	0	0	0	4	0	0	5	2	—5
33	62	58	93	0	0	0	4	0	0	1	4	—10
2	84	74	88	0	0	10	0	0	0	3	3	+6.5
25	80	71	88	0	4	2	0	1	2	3	3	+2
16	69	60	87	0	9	0	0	0	0	2	3	+4.5
36	140	122	87	0	0	17	1	0	0	6	4	+2.3
6	54	46.5	86	0	0	0	5	2.5	0	3	1	0
34	67	58	86	0	0	7	2	0	0	3	2	+6
4	27	23	85	0	0	0	0	4	0	0	2	—3
24	95	80	84	0	11	3	0	1	0	4	3	0
11	133	108	81	11	6	0	2	1	5	2	7	—6
3	31	25	80	0	1	0	0	1	4	1	1	0
35	33	26	79	0	5	0	2	0	0	2	0	+7
14	89	69	77	11	9	0	0	0	0	2	4	0
22	82	62	75	0	12	5	0	0	3	2	3	+2
15	131	97	74	0	10	12	10	2	0	5	3	+2
32	156	115	74	0	18	14	9	0	0	5	5	0
20	93	68	73	22	3	0	0	0	0	4	2	—4
5	163	116	71	19	16	0	3	0	9	4	6	+2.6
29	77	53	69	11	0	0	13	0	0	3	2	—14
30	48	32	67	0	0	0	16	0	0	2	1	—5.5
19	73	48	65	0	11	0	0	0	14	3	1	+4
10	158	109	62	11.5	15	15	0	0.5	7	5	4	+3
21	113	70	62	0	24	0	3	0	16	3	3	+7
13	84	50	60	22	4	6	0	0	2	1	3	—3
8	86	50	58	11	12	11	0	0	2	1	3	+5
27	145	84	58	22	28	4	4	0	3	4	4	+3
23	47	24	51	0	12	0	0	2	9	0	2	+4
18	96	49.5	51	11.5	14	0	5	3	13	1	3	+5
28	92	42.5	46	11.5	21	3	3	0	11	3	1	—3
31	54	24	44	11	12	3	0	0	4	0	2	+2
26	57	22	38	11	19	0	5	0	0	1	1	—21

Dioestrum in Foaling Mares

Day[6] states that the greatest irregularities in foaling mares are prolongation beyond the ninth day of the onset of foal heat and long periods of dioestrum following foal heats. He considers the latter to be common in mares in poor flesh and in heavy milkers, and the dioestrum may last until the foal is weaned. This type of irregularity has been advanced by breeders as one of the chief reasons for breeding all but grossly diseased mares during the foal heat. Hence, this becomes important in view of the ever-increasing evidence submitted by Williams,[14, 15] Dimock,[7] Day,[6] Jennings,[11] and others against the practice of breeding mares during the foal heat.

Failure to show heat after unsuccessful ninth-day breedings, was manifested a total of 23 times by 15 mares in these records. The average duration of the dioestrum was 5.1 months. Four of the 15 mares repeated the abnormality twice and two repeated it three times. There was no significant relation of the frequency of this irregularity to age, year or month. The tendency was definitely for these mares to repeat the long periods of dioestrum. Out of 42 times when these 15 mares did not conceive from breeding during the foal heat, they showed subsequent normal periods 19 times and failed to show heat 23 times. Seven of the 15 affected mares were

heavy milkers, whereas but two were poor milkers. As a group the heavy milkers showed an average dioestrum of 6½ months and the two poor milkers were out of heat for an average of 2.5 months.

In general, the other most commonly encountered abnormality in foaling mares is delay in the onset of foal heat. In the herd under consideration the onset of the first post-partum heat period was prolonged more than 40 days in 18 mares for a total of 32 times with an average duration of three months. Again no correlation could be established between the year, month or the age of the mare and this irregularity. Nine of the 18 mares repeated the abnormality at least twice and in three of these it was the sole abnormality noted. Conception occurred during the first recognizable heat period following parturition in 23 of the 32 times in which the onset of foal heat was delayed. In six cases regular heat periods but without conception occurred, in two cases the first heat was a long one, but without conception resulting, and in one case the initial heat was followed by a two-months' period without heat.

Long Heat Periods

Caslick[4] has written an excellent description of barrenness resulting from this type of abnormal heat period. His figures show that 75% of barren thoroughbred mares have this type of cycle. The majority of these mares went out of the long heat by April 1, and thereafter had regular cycles. He was able to demonstrate that they ovulate as regularly as any mares and that the ovulation period can be detected by vaginal examination. Day[6] concluded that many mares go into true anestrus in the winter and then tend to have long heat periods in the early spring, especially if in poor condition due to poor feed. Heat periods of 30 to 60 days may be observed followed by ovulation and regular cycles, or the follicle may regress, the mare go out of heat and be in again in seven days. They become normal when a corpus luteum forms. These mares have also been condemned as mares with cystic ovarian degeneration.

Ten of the 36 Arabian mares showed prolongation of heat periods for a total of 13 times. There were two mares that repeated the abnormality more than once. The average duration of the prolonged heat periods was one month with a range of 15 to 75 days. Age of the mare and the year had no relation to the incidence of this abnormality, however, all but one of the long heat periods were recorded in the months of December, January, February and March. The one exception occurred in July. In all 13 cases the mares were bred repeatedly during the long heat periods, and 10 conceptions ensued. Two mares were responsible for the three cases in which no conception occurred—both were mares with poor records. Six of the long heat periods occurred in barren mares, while the other seven occurred in foaling mares all of which showed a delayed onset of the foal heat.

Dead or Diseased Foals

Williams,[14, 15] Jennings,[11] Dimock,[7, 8, 9] and Caslick[4] have done much valuable research on the bacteriology and pathology of various genital infections in mares. These research workers have demonstrated that *Streptococcus genitalium* is the organism responsible for the vast majority of cases of cervicitis and metritis and is likewise found in many aborted fetuses and dead foals. He has emphasized the importance of vulvar abnormalities in producing clinical windsucking which, in turn, maintains a constant low grade infection in the uterus. Day[6] states that windsucking is the cause of barrenness in over 50% of mares barren for more than three years. Dimock[8] has stressed the role of the Streptococcus in parturient lacerations and injuries to the vulva as well as unhygienic breeding practices. Jennings,[11] Williams,[14, 15] and others have written extensively on the increase in abortions, dead and diseased foals, retained placentas and subsequent sterility following promiscuous breeding during the foal heat. Dimock[7] has written of epizootics of virus abortion and Salmonella abortion in thoroughbred mares, however, as far as can be determined the Arabian mares under consideration were never exposed to either of these specific abortifacient infections.

Thirteen mares accounted for the 17 recorded dead or diseased foals with four of these mares having two dead foals each. As a group, these mares averaged 12 years of age at the time they lost their foals. All but one were over eight years of age, the exception being a six-year-old mare that foaled viable twins as a four-year-old primipara. Both twins were successfully raised, but the mare has had a very poor breeding record subsequently. Her next foal was a viable colt after which she had a delayed onset of foal heat, and then conceived after breedings in two heats for the dead foal recorded above. She has been barren for over two years since. Five of the dead foals followed breedings in the foal heat while 12 were to subsequent breedings. Before producing dead colts, these mares averaged one viable foal every 14 months for four years, whereas after the diseased pregnancy the average fell to one viable foal every 19½ months for five years.

Repeated Breedings Without Conception

Mares which are bred repeatedly during regular heat periods without recognizable conception have been classed, either as mares with chronic metritis,[8] or simply as cases of physiological exhaustion.[7] Fourteen mares fell in this classification a total of 24 times, and six of them showed it at least twice. The average duration of the repeated breedings was five months with a range of two to 10 months. The average age of the affected mares was 13 years, all but two being over 10. Nine of the 13 mares that produced dead colts likewise suffered from this abnormality.

Successful conceptions occurred in eight instances but, in the majority of cases, the mares eventually failed to show heat for varying periods and then returned to normal cycles. About half of these conceived and foaled normally on the subsequent breeding, whereas the other half returned to the same history of repeated breeding and no conception. Two mares were condemned as nonbreeders. In two cases the failure to conceive may have been attributable to temporary infertility in the stallion due to sluggish physical condition. As a rule, however, the 10 stallions were in good breeding conditions and all were of good fertility throughout their retention in the stud.

Results of Breeding in Foal Heat

The advisability of breeding foaling mares during the foal heat has been seriously questioned for some time by workers on equine genital diseases. Dimock[8] has demonstrated that during this period the genitalia of the brood mare are in a highly susceptible condition for the establishment of streptococcal infections, and Jennings,[11] Williams[14, 15] and others[4, 12] have presented enough clinical evidence to support this view. In nearly all reports the percentage of conceptions during the foal heat have been significantly lower than those during subsequent heat periods, particularly when the mare has been withheld from service on the foal heat.

In the Arabian herd under consideration the first day of the foal heat was observed once on the 5th day, three times on the 6th, 15 on the 7th, 15 on the 8th, 54 on the 9th, 24 on the 10th, 11 on the 11th, five on the 12th, four on the 13th, once on the 14th, and two times on the 15th day *post partum*. The onset of foal heat tended to be early in the summer months but later in the late winter months. Table II shows the results obtained from breeding on the various days of the foal heat.

Table II reveals a rather interesting trend toward an increase in the percentage of conceptions when the last breeding during the foal heat approaches the 12th to 13th days *post partum*. Sixty-two per cent of 67 mares withheld from service during the foal heat or in which there was a delayed onset of the first *post-partum* heat, conceived to one or more services during a single heat, 24% did not conceive on the first heat and 14% showed no subsequent heat although not with foal. The same figures for 23 maiden mares were 61% conceptions in the first heat, 13% failed to conceive and 26% showed no subsequent heat. These figures amply confirm the findings, previously reported, of Jennings, Williams, Caslick, and others.

Effect of Duration of Pregnancy on Fecundity of Stud

As early as the 15th century Circa[5] stated that mares that tarry longer than 12 months rarely produce offspring of value. Von Oettingen[13] and Williams[14] state that foals carried for excessively long gestation periods seldom achieve success as brood mares or stallions. Through the coöperation of the Board of Directors of the Arabian Horse Club of America, it was possible to obtain the duration of the gestation period of 18 of the 36 mares and of eight of the 10 stallions in the Arabian herd under discussion. Table III illustrates the breeding records of these mares:

TABLE II—RESULTS OF BREEDING ON VARIOUS DAYS OF THE FOAL HEAT

Day post partum of last breeding	Total	No. conceived	No. returned	No. failed to show heat	Total failed to conceive	% failed to conceive
6	2	0	1	1	2	100
7	11	4	4	3	7	64
8	9	6	2	1	3	33
9	32	10	14	8	22	69
10	27	12	8	7	15	56
12	23	11	10	2	12	52
12	12	10	2	0	2	17
13	10	7	3	0	3	30
14	2	1	0	1	1	50
15	2	1	1	0	1	50
Total 130		62	45	23	68	53

The records of the eight stallions for which the gestation period was known are less impressive. Three of the eight were carried more than five days over the herd average and these three bred 57 mares with 56% live foals and 11% dead foals resulting. The other stallions which were carried one to four days under or over the herd average bred a total of 96 mares with 70% live foals and 4% dead foals.

Although exceptions occurred, these figures seem to support Williams'[14] contention that prolonged gestation tends to reduce the efficiency of mares and stallions in the stud. In addition, it appears possible that excessively short gestation periods can be just as detrimental to the breeding worth of the resulting offspring. From the results shown in Table III it would appear that the most efficient mares

in the group were those that were carried within four days above or below the herd average.

Treatment of Sterility

Caslick, Dimock, Jennings, Day, Williams, and others have amply demonstrated that sterility of the brood mare, due to genital infection, can be prevented by the thorough application of strict breeding hygiene, withholding suspected mares from service at the foal heat period and the prudent application of Caslick's operation for windsucking. The proper handling of the irregularies in the heat periods remains as the most important factor in equine sterility. Caslick has made a valuable contribution in his detection of regular ovulation in thoroughbred mares by means of the vaginal speculum regardless of whether they are showing regular cycles, long heats or no heat at all when submitted to the teaser.

An important part of handling the abnormal cycles is, of course, to recognize them when they occur. For this purpose a system of regular teasing is essential in detecting long estrous periods. The routine use of the rat test[10] for diagnosing pregnancy on the 45th day would detect those cases in which no heat is shown following unsuccessful breedings. Caslick recommends that mares showing a long heat period either be allowed to go out of the long heat and bred on the subsequent heat which is usually normal, or that they be bred when ovulation is detected by vaginal examination. Various methods have been advocated to induce heat in mares showing a long dioestrum, the most popular of which has been the use of various gonad stimulating hormones.[15] During the 1942 and 1943 breeding seasons of the Army remount stallion standing at the University Farm in Davis, an opportunity was afforded to determine the efficiency of one of these hormone products. The hormone used was the gonadotropic principle of pregnant mare serum prepared by Professor H. H. Cole of the Animal Husbandry Department, and was administered subcutaneously in doses of 750 to 1000 rat units. Twenty-seven mares either failed to indicate heat when submitted to the teaser after an unsuccessful breeding, or had never shown heat during the season. The pregnant mare serum induced heat in 18 of the 27 mares; the other nine remaining refractory. Heat was observed after a lapse of an average of five days and lasted an average of four days in these 18 mares. Ten of the 18 mares conceived and produced normal foals to breedings on the induced heat; five failed to conceive during the induced heat, but conceived in the subsequent normal heat and foaled normally. The remaining three failed to conceive to any of the breedings. The prolonged dioestrum following unsuccessful breedings in these mares was detected by means of the rat test for pregnancy on the 45th day. Undoubtedly the majority of these mares would have gone as barren mares for the year but for the hormone therapy.

Four mares during the 1943 season showed long heat periods in February, March and April. These long heats lasted an average of 21 days with a range of 17 to 25 days. Only one conception occurred in the long heats in spite of an average of three services in each. In the other three cases the mares went out of the long heat and returned in 15 days with subsequently normal heats. Three of the four conceived and of these, one died during the winter, one aborted, and two foaled normally.

Strict breeding hygiene, the Caslick operation, regular teasing, vaginal examinations, routine application of the rat test for pregnancy, and the use of various hormone products, such as pregnant mare serum, should prove to be valuable aids to increased fertility in horse breeding establishments.

TABLE III—BREEDING RECORD OF MARES OF ARABIAN HORSE CLUB OF AMERICA

Days carired	No. mares	Total breeding months	% normal months	% dead foals	% no heat	% long heat	% repeat breed	Total foals	Pregnancy variation of foals
Average	2	126	83	0	11	2	4	9	OK
1-4 days over average	3	260	87	0	13	0	0	19	+1
1-4 days under average	3	187	89	0	11	0	0	14	OK
5 days or more over average	4	298	69	3	16	1	11	17	OK
5 days or more under average	6	450	67	10	19	1	3	26	—4

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Reminiscences VI

By N. S. MAYO
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CUBA captivated me. Forty years ago, Havana was not the tourist city that it is today, but a bit of old Spain in a tropical setting. After interesting and cordial interviews with President Palma, the first president of the Republic, and with the Secretary of Agriculture, I accepted the position of Vice-Director of the new Cuban Agriculture Experiment Station and Chief of the Department of Animal Industry. The Experiment Station was located about 12 miles south of Havana in an old Spanish cuartel (barracks). The building was in the form of a quadrangle, surrounding a large patio. The walls were of thick masonry

The main building of the Cuban Experiment Station was formerly a Spanish cuartel

for protection. Our houses were located with a farm adjoining in the fine grounds adjoining the station buildings. We had our own electric and water systems. The station staff was composed largely of American college men, experienced in agricultural research work.

I returned to "the States" for my family. In the Union Depot in Kansas City, I encountered Doctor Eichhorn and offered him the position as my first assistant, but he was starting for Austria to get married and so declined the offer.

One of the first and biggest problems was the language. My first student assistant was a young Cuban named Emelio Luaces. He was an excellent interpreter. He would not only tell what the man said but also what he was thinking, which was often different and much more important. When I no longer needed an interpreter Luaces came to the States, graduated at the Kansas City Veterinary College, returned to Cuba, became my assistant and when I left the Island succeeded me as Veterinarian to the Experiment Station. He has long been active in building up Cuban Agriculture and has been a member of the Cuban Congress. So Doctor Luaces' name can be added to the list of students whom I may have, in some measure, interested in veterinary medicine and who "made good" in the profession.

Sudden transplantation to an exotic country among new people with a different background, engaged in unfamiliar occupations, in a climate where the houses are designed to keep as cool as possible instead of to retain as much heat as possible and amid luxuriant colorful vegetation, produces vivid and lasting impressions. Although it entailed its quota of confusion, at the same time it encompassed many new interests and delightful experiences; at least, viewed in retrospect they are delightful.

The Cuba of that day was widely different from what it is now. In 1904, Havana was recovering from effects of 3 years of war with Spain. It had but recently become safe for Americans through the successful campaigns of the American Army against malaria and yellow fever. General Gorgas said of these campaigns that they converted what had been a pesthole for 300 years into one of the most healthful cities of the world. It had narrow, crowded streets like Spanish cities, large churches, few hotels and Spanish type dwellings built about patios. The *Prado* (Public Walk) was the only wide avenue and the now famous *Malecon* (Wharf Street) which has since been extended several miles along the Gulf of Mexico was of little importance. *Obispo* (Bishop) Street, the principal retail street, was very narrow but fashionable.

My first experience with dictionary Spanish is vividly recalled—my wife wanted some eggs (huevos). I looked up the word and went to a

store. I told the old Spaniard I wanted some Thursday (jueves). In Spanish "h" is not sounded and "j" is sounded like "h" in English. He threw up his hands and said that he didn't have any. I knew that he had eggs, so I drew a picture of an egg. He brought a round, hard biscuit. I then draw a hen, and got my eggs. Afterwards, when I wanted eggs, the old *bodeguero* would tell me that he had ordered some Thursdays but they were in the Havana Customs and the duty was very high. Once I tried to tell a young man that his girl was pretty, but instead of saying bonito I said boniato which meant sweet potato.

On my first trip to the Province of Camaguey, in the cattle region, I encountered an old Texas cattleman who was shipping Coast cattle to Cuba. He invited me out to a ranch where he had sold a Cuban some cows. The Cuban was riding through a large bunch of cattle, picking out his cows. I could not determine what points he considered in selecting the animals, so I asked through an interpreter. The Cuban said "the horns, the hair, and the tail". This was, to me, an entirely new method of judging cattle, and an explanation was asked. He said that he was picking cows with big strong horns because he sold the bulls for working oxen, and in Cuba they follow the Spanish custom of tying the yoke to the horns. He was selecting cows with fine short hair because they did not suffer so much from tick infestation; and he thought cows with slender tails walked faster than others, so the bull calves would make faster work oxen.

During the revolution of '95 and '98, the Cuban cattle industry had suffered severely. If one side could not eat the cattle, they killed them, to prevent the other side from getting them. The native cattle were not of high class. Progressive Cubans had tried to import pure-bred bulls from the States, but they said that the animals "got sad" and died. I tried immunizing Northern bulls by injecting small quantities of blood from a ticky animal before shipping them to Cuba, and had very good results. This method had been used previously by Dr. C. A. Cary, of Alabama.

In those days, there were very few good roads in Cuba and country transportation was almost entirely by horseback or by big two-wheeled ox carts. The country roads were worn deep by centuries of travel and in the rainy season were ditches of deep red mud. It was interesting to note that, in asking a native the distance to a certain place, he would tell you how long it would take to get there by horse or ox cart.

The Mayos on the porch extending the full length of their spacious bungalow-type home on the grounds of the Cuban Agricultural Experiment Station. To the left is Marguerite (Mrs. Ashe Lockhart) Dorothy, deceased, one of the twins mentioned earlier in the "Reminiscences" is beside her sister. Mrs. Mayo stands next to Doctor Mayo who is holding Bob on his lap. Bob is now executive officer of the 6th Marine Battalion of Engineers, the first of the American armed forces to land on Okinawa. He had previously spent some time on Guadacanal

The island of Cuba which was to be my home for five years lies 110 miles south of Florida, wholly within the tropics. It is 730 miles long, has an average width of 60 miles and contains 41,634 square miles. The eastern portion is hilly and traversed by a mountain range 2500 feet high. The highest peak (8320 feet) is in the Sierra Maestra range. There are few snakes, but one species of boa constrictor grows to a length of 8 to 10 feet. The forests include cedar, pine, mahogany, great numbers and many varieties of palms. The two most important crops are sugar cane and tobacco. The climate is equable with a heavy rainfall in summer. The people are, in the main, descendants of immigrants, chiefly

from Spain, and descendants of African slaves. All the native Indian population was long ago exterminated by the Spaniards.

Another problem incident to our early residence in Cuba was the different customs. In going to a town to make some investigations, I was supposed to call upon various officials, with the result, that often several officials accompanied me out to a farm to the consternation of the farmer. During the first intervention, Army sanitary officials pursued a vigorous campaign so that being an American I was in many cases viewed with concern. In one instance, when investigating the loss of some hens from food poisoning, the farmer stated that he had lost no chickens and none were sick. However, after a smoke and a visit one sick hen was found and treated and, finally, a half dozen more were brought in from the banana patch.

Cuban horses were small but "wiry", most of them were "single footers", and excellent saddle horses. In riding through the country in the rainy season, one had to beware of flash floods. Doctor Dimock will recall our swimming our horses through a rushing stream where the bed had been dry a few hours before. Doctor Dimock's horse stumbled and he had to swim back, but his horse got across, so the doctor had to swim the stream a second time to reach his mount.

Although there were but few livestock sanitary regulations covering the importation of livestock, there were no serious diseases brought in. Under the old Spanish military regulations, glanders was handled by the Army, and I was glad to leave it there. The more important animal diseases were tick, lung worm, live fluke, screw worm infestations, anthrax, blackleg and hog cholera.

During the dry season (winter), when pastures were short, ticks and lung worms were a serious problem. The Cubans used a solution of "cebadilla" in alcohol to wash the infested animals. This was effective but expensive. I devised an arsenical solution that was cheap and gave excellent results. This I called the "Cuban dip". The U. S. B. A. I. changed the formula of this dip slightly and adopted it as the official dip. Tetanus was common, even the countryman recognized the symptoms. There were two kinds—"moon" tetanus and the regular kind. In the former, there was no visible lesion. In our experience, if the attack were sudden and fulminating it was usually fatal; otherwise, with aggressive antitetanic treatment, good results usually followed.

(To be continued)

Tuberculosis in 1845 and Now

One hundred years ago the death-rate in this country from tuberculosis was 400 per 100,000 inhabitants—approximately one death in four being due to this disease. By 1900 this rate was cut in half. Improved sanitation and better nutrition are thought to have been among the more important causes of this decline in mortality.

From 1900 to 1920 the death-rate from tuberculosis was again halved and fell to 100 per 100,000 population. Earlier diagnosis, due in part to the X-ray, tuberculosis sanitoria, economic gains, improved housing and better sanitation, are credited with much of the decline.

In the next 20 years the rate again declined 50% and in 1940 stood at approximately 50 per 100,000 persons. During this period earlier diagnosis, improved treatment and the eradication of bovine tuberculosis, were the new recruits in the war against the disease that has been termed captain of the men of death.

Public health officials think another 50% reduction in the mortality from tuberculosis is possible. Beyond that goal they are not planning. That would not satisfy veterinarians. If tuberculosis in man was their problem their only goal would be eradication.

Veterinary Inspectors Handle Huge Flow of Livestock

In supervising the interstate transportation of livestock to prevent the spread of diseases, veterinary inspectors of the Bureau of Animal Industry, U. S. Department of Agriculture, last year, safeguarded the health of more than 96,000,000 cattle, sheep and swine. This number considerably exceeded that of any previous year. Most of the inspections were conducted at the 48 principal stockyards of the country.

Cattle and sheep dipped to control injurious parasites numbered 290,615. In addition 438,166 swine were immunized against cholera, preparatory to their distribution for feeding or breeding purposes.

The Bureau's employees also supervised the cleaning and disinfection of 3,518 railroad cars and large numbers of trucks that had carried animals affected with disease. Veterinary inspectors performed many other duties including the segregation and control of cattle that had reacted to tests for brucellosis and tuberculosis. They expedited the movement of such animals through the yards to slaughtering establishments. The inspectors also examined all ruminants and swine for foot-and-mouth disease.—*U.S.D.A.*

Hemoglobin Tests on 175 Cases Anaplasmosis

By H. C. SMITH*
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and D. E. HOWELL**
Stillwater, Oklahoma

A SEVERE epidemic of anaplasmosis in cattle occurred in Oklahoma during the last five months of 1942. On one large ranch in the northern part of the state a total of 472 cases of anaplasmosis occurred. Of these, 194 died before treatment. The others were treated experimentally as recorded in a previous paper.[9] This afforded an excellent opportunity to determine the value of hemoglobin readings as an indicator of the probable course of the disease and to follow the effect of the drugs in aiding the blood forming organs in increasing the hemoglobin. Furthermore, hemoglobin readings provided an excellent indication of the need for drug treatment.

The hemoglobin content in the blood of normal cattle is fairly constant. McCay[6] demonstrated that there was no relationship between the hemoglobin level and such factors as breed, milk production or length of lactation. Sex was shown to influence the hemoglobin content as normal cows averaged 10.9gm, while mature bulls averaged 12.8gm. Brooks and Hughes[2] found the mean hemoglobin threshhold of 297 head of cattle to be 10.96gm per 100cc of blood. He found no appreciable difference due to breed, age or prolonged fasting. However, Manresa and Reyes[5] found that purebred cattle, raised in the temperate zone, suffered marked hemoglobin losses when introduced into the Philippine Islands. Three months after introduction the mean hemoglobin content had fallen from 9.87 to 6.76gm per 100cc. The percentage of hemoglobin in the blood of native animals was not altered. Neal and Becker[7] working with "salt sick" cattle found that the hemoglobin content of their blood was much lower than of normal animals. They found an average of 13.27gm in normal animals and 8.28gm per 100cc in visably affected "salt sick" animals.

Various authors, Graf,[3] Boynton,[1] and others have shown that the hemoglobin content of the blood drops seriously in anaplasmosis while Rees and Hall[2] indicated the approximate hemoglobin content in various stages of the disease. The average of the normal animals was 11.68, of animals in the incubation stage 10.51, in the subclinical stage 7.83 and in the clinical stage 4.67gm per 100cc of blood. Their data show that during the crisis of the disease the hemoglobin was functioning at its maximum capacity.

Experimental Procedure

The data given here were obtained from 175 field cases of anaplasmosis during a severe outbreak of this disease. Hemoglobin readings were made with a Tallqvist hemoglobinometer. All readings were made by the same individual under similar conditions and these readings were checked with a Dare hemoglobinometer. Results with the two methods never varied by as much as 10%.

Blood smears were taken from the same sample of blood and all cases checked by microscopic examination. If the percentage of hemoglobin was above 70 the animal was not considered sick enough to require treatment and was released. Each treated animal was numbered for identification. Whenever possible additional hemoglobin readings were taken. Most animals were observed daily and their condition recorded.

Observations

Under range conditions it is not possible to pick out animals in the early stage of anaplasmosis and it is not practical to attempt to

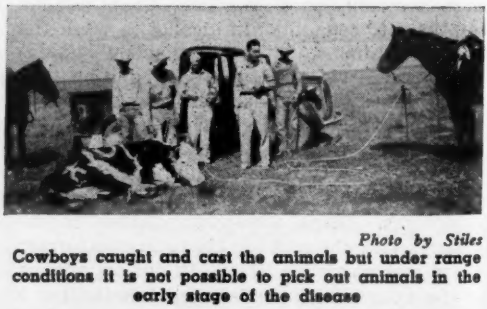

Photo by Stiles

Cowboys caught and cast the animals but under range conditions it is not possible to pick out animals in the early stage of the disease

treat animals until clinical symptoms appear. Observations on these cases indicated that even in herds examined daily the hemoglobin content of animals showing clinical symptoms

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has reached approximately the lowest level to be expected. As a result it may be possible to predict the probable outcome of anaplasmosis by hemoglobin readings. This is illustrated by Table I. It is interesting to note that

TABLE I—SHOWING THE RELATION OF PERCENTAGE OF HEMOGLOBIN IN THE BLOOD TO SURVIVAL IN TREATED ANIMALS

% Hemoglobin in blood (Tallqvist)	Average grams hemo. in 100 ml. blood (Dare)	Animals examined	Number lived	Number died	% lived
25	4.1	26	7	19	27.0
30	4.8	16	7	9	43.65
35	5.7	22	18	4	81.8
40	6.4	10	7	3	70.0
45	7.2	17	14	3	82.3
50	8.1	7	6	1	85.0
50	...	77	74	3	96.1

10% increase in hemoglobin raised the probability of survival by more than 50% while animals with more than 50% hemoglobin in the blood had a 69% better chance of survival than those with 25%. Animals showing some of the clinical signs of anaplasmosis yet having more than 70% hemoglobin were seldom positive microscopically.

The value of the various therapeutic agents used experimentally can be readily evaluated by comparing the survival of animals treated having 35% or less hemoglobin. This data is summarized in Table II.

Discussion

Many authors have shown that the hemoglobin drops alarmingly in severe cases of anaplasmosis and some have suggested that death results from the decreased oxygen carrying capacity of the blood. The data given here suggest that it is possible to predict the probable outcome of field cases of the disease when the first severe symptoms are seen. The chances for survival in animals with less than 30% hemoglobin are slight, while animals showing more than 50% hemoglobin usually recover. Only 27% of the animals with less than 30% hemoglobin lived, and it is probable that most of those dying before being found were low in hemoglobin because this was indicated by numerous post-mortem examinations.

As pointed out by Kernkamp and Donham[4] the Tallqvist and Dare type hemoglobinometer are most useful to the practicing veterinarian. The use of the former under field conditions appears to be sufficiently accurate, particularly if readings are made by the same individual and checked occasionally with more accurate methods and its use provides a valuable diagnostic aid. Small errors made in such determinations will not be important clinically.

Unless the condition of the animal is known, it is not possible to evaluate accurately such therapeutic agents as may be used. In our experience the hemoglobin content of the blood was found the most valuable indicator of the condition of the animal and essential to prognosis.

Summary

Studies in 175 field cases of anaplasmosis indicate that the concentration of hemoglobin is a valuable clinical indicator of the probable outcome of the disease.

Animals having less than 30% of the normal amount of hemoglobin in the blood have little chance of survival under ordinary range conditions.

Tallqvist hemoglobinometers provide a convenient and sufficiently accurate method of measurement for hemoglobin content of the blood.

TABLE II—PERCENTAGE OF SURVIVAL OF ANIMALS HAVING 35% (TALLQVIST) OR LESS HEMOGLOBIN WHEN TREATED WITH DIFFERENT THERAPEUTIC AGENTS

Product	Animals examined	Number lived	Number died	% lived
Sodium Cacodylate plus glucose.	3	0	3	0
Glucose only	8	2	6	25
Formalin plus glucose	12	3	9	25
Neosalvarsan plus glucose	5	5	0	100
Cobalt chloride plus glucose	4	3	1	75
Tryparsamide plus glucose	6	6	0	100
Cobalt sulphate plus glucose	7	4	3	57
Aricyl plus glucose	4	3	1	75
Calcium gluconate plus glucose.	4	2	2	50
Sodium iodide plus glucose	4	0	4	0
Sulfathiazole plus glucose	4	1	3	25
Blood transfusions	3	2	1	66⅔

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Uniform State Regulations for Imported Livestock

By W. J. Butler*
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THE only justification for health regulations governing the interstate movement of livestock is to prevent the spread of disease.

For the past many years, and even at the present time, there has been a jumble of regulations. Due to the geographic differences and the differences in the method of handling livestock in the eastern states as compared with the method under range and semi-range conditions in western states, it is perhaps too much to hope for complete uniformity in health regulations governing the interstate movement of livestock, but there is no legitimate reason in disease prevention why the basic principles should not be uniform.

Veterinarians are not entirely to blame for the present confusion of regulations. Stockgrowers are partly responsible for a number of confusing regulations. At least one state, where regulations are drawn up and promulgated by stockmen and stockmen alone, has very confusing health regulations governing the importation of livestock into that state.

Veterinarians and livestock raisers, alike, have been accused of promulgating, under the guise of health regulations, rules that have had the effect of uncalled for, traffic barriers. There may have been such instances, but if so, they have been few and far between and on the whole the accusation is unjustified.

What then is the reason for the continued lack of uniformity in regulations governing the interstate movement of livestock?

The primary and fundamental reason is due to our lack of knowledge of livestock disease conditions in the various states and the lack of uniformity and adequacy of the veterinary service for the control of dangerous diseases of livestock, which is provided in the several states.

When one responsible for protecting the health of the livestock in a given state does not know livestock disease conditions in other states and has no definite knowledge of whether or not adequate veterinary service is provided in them to control dangerous disease, the tendency is to act blindly and err on the side of safety. This leads to the promulgation of stringent regulations. The law of self-preservation is the first law of Nature. Disease control officials are charged with the duty of protecting livestock in their respective states. It is but natural that they should issue and endeavor to put into effect regulations that they consider necessary to best prevent the introduction of disease into their states.

We will not have uniform regulations until we have a central bureau or department of livestock vital statistics for all the states. To reach the goal of uniform regulations it will also be necessary for livestock disease control agencies to be taken out of politics and placed upon an adequately financed, professional basis. A bureau of livestock vital statistics rightly should come under the jurisdiction of the United States Bureau of Animal Industry.

I am a believer in state rights—nevertheless, I am of the opinion, inasmuch as the United States Congress has placed control of the interstate movement of livestock under the jurisdiction of the United States Bureau of Animal Industry, that the Bureau should assume the duty of promulgating adequate regulations governing the interstate movement of livestock. Unfortunately, Bureau regulations governing the interstate movement of livestock do not take into consideration certain dangerous diseases, for example, bovine brucellosis. This fact, in addition to the lack of livestock disease vital statistics and the lack of uniform veterinary service, adds to the confusion and is an added reason for the multiplicity of state regulations.

We are also of the opinion that the federal Bureau of Animal Industry should spend more of its energies in building up and supporting livestock disease control agencies in the various states than they have in the past.

We suggest a system of assistance such as has been placed in operation by the United States Public Health Service in coöperation with the various public health agencies. A somewhat similar system of coöperation with the various state highway commissions by the Bureau of Public Roads and the United States Department of Agriculture has long been in operation and is being continued by the Public Roads Administration.

Under the present system of livestock disease control the federal Bureau of Animal Industry has given the most aid to states that apparently are farthest from having adequate livestock disease control agencies. This system penalizes those states that are earnestly endeavoring to control livestock diseases. It

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tends to lower state veterinary service and in the end is not productive of the best results in disease control, which is inseparable from building up, on the spot, a competent veterinary profession and a good veterinary service.

There is no desire to minimize the good that the United States Bureau of Animal Industry has accomplished. It has saved the livestock industry of the United States from tremendous and continued losses. We need it! We cannot do without it! Nevertheless, it can improve upon its past record by assisting in the building up of non-political, disease control agencies in the various states. Such a procedure, with the Bureau assuming more adequate control over interstate movement of livestock, will entail a greater and even more important activity on the part of the Bureau than is exercised at the present time.

With a sincere desire to be helpful and with no desire to be adversely critical we suggest the following program:

1. Establish a Department of Livestock Vital Statistics within the United States Bureau of Animal Industry. Vital statistics reports to be published at least once a month for public distribution. Expand the present system of reporting livestock disease conditions disclosed on post-mortem inspection, to include all slaughter-houses and abattoirs under federal and state supervision.

2. The United States Bureau of Animal Industry to issue complete regulations governing the interstate movement of livestock. Certificates of health issued by accredited veterinarians to be accepted in the enforcement of such regulations. The Bureau to place veterinarians in all public sale yards considered to be doing an interstate business and to assume the duty of issuing health certificates on the movement of livestock out of such yards. States to retain the right to quarantine, re-test or re-inspect livestock when it arrives at destination within their borders, as they consider advisable.

3. The Bureau of Animal Industry to assist state disease control, financially, in proportion to the amount spent by the state for the control of livestock disease. The Bureau of Animal Industry to maintain a federal office in each state with an inspector-in-charge and such other personnel as is advisable or necessary. Financial assistance to the state to be dependent upon the immediate report of the occurrence of any dangerous disease of livestock to the Bureau and other coöperation.

4. Accredited veterinarians to be given a more definite role in the control of dangerous diseases of livestock within a state.

5. Consistent and active coöperation between stockgrowers, the United States Bureau of Animal Industry, state regulatory officials and veterinary practitioners, all recognizing the responsibility of each agency in its particular field.

★ ★ ★ ★

★ ★ ★ BUY WAR BONDS ★ ★ ★
AND HOLD THEM

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Stilbestrol Diproprionate and Estradiol Benzoate

Two hundred sows received intramuscularly 2 to 5mg of estradiol benzoate (dimenformen). Of these, in 196 cases estrus began with monotonous regularity at about the 72nd hour. Two sows showed estrus within three weeks, which may or may not have been as a result of the injection. Two sows failed to show estrus. On examination these two animals were found to be hermaphrodites.

Of the sows that showed estrus those which were mated between 24 and 30 hours after estrus commenced almost invariably conceived. Indifferent results were obtained when sows were mated within 24 hours of the commencement of estrus.

Ten sows were given 5mg of stilbestrol dipropionate intramuscularly. Eight showed estrus between 24 and 72 hours later. The two others responded to 10mg as a second injection. Five of the ten sows (mated about 30 hours after commencement of estrus) became pregnant. I have no history of the other five.

Sixty-four cows and heifers received stilbestrol dipropionate intramuscularly last summer and autumn. The dose varied from 10 to 25mg. Sixty showed estrus at periods varying from 12 hours to a week after treatment. The other four were heifers and responded to a larger dose after three weeks. In a fair number of cases the estrus lasted for several days, but in some cases the animals returned to estrus again in a week or ten days. The cows and heifers served at the first estrus, with a few exceptions, did not conceive. Where service was delayed until a second heat appeared, pregnancy followed in most cases. A number of heifers did not return to estrus a second time and the result was therefore disappointing. It should be noted that manual examination of the ovaries was not carried out prior to, or during, the treatment.

Four cows were given 25mg of stilbestrol dipropionate in an attempt to induce labor but without success. Six cows received 25mg for retained fetal membranes. The treatment was not successful.—R. P. Pierse in *Veterinary Record*, 55:43, p. 389.

Calcium, Phosphorus, and Vitamin D in the Rations of Animals

By J. LaVERE DAVIDSON, Lt. Col. V. C.
Sioux Falls Army Air Field
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IN RECENT years investigators have shown that certain minerals are essential participants in practically every metabolic process carried on by the animal body. Among the elements which are probably of most significance in this respect are calcium and phosphorus, and for this reason it is of importance to insure an adequate supply of these minerals and at the same time provide sufficient vitamin D, which is essential for the utilization and transformation into normal bone and teeth.

Calcium and Phosphorus

It is often said that the only minerals likely to be deficient in the small animal diet are calcium, phosphorus and possibly iron. This writer has found that although deficiencies of other minerals occur, they are usually secondary to some other disease. Both calcium and phosphorus are essential for bone and tooth structure. Approximately 98% of all the calcium in the body is contained in the bones where it is combined chiefly with phosphate and to a lesser extent with carbonate. When either calcium or phosphorus is lacking there is stunted growth, deformities (which in the writer's opinion may account for some of the monstrosities seen in large animal obstetric practice), decayed teeth, rickets and tetany. Even in adult life an inadequate supply of calcium and phosphorus over a long period may lead to osteoporosis with resulting skeletal weakness and deformities. This is especially noticeable in swine in certain areas of the United States.

Phosphorus.—More emphasis is usually placed on the role of calcium in nutrition than on phosphorus. This is no doubt because, in the adult, phosphorus deficiency is relatively uncommon, probably by reason of the greater amount of phosphorus-containing food consumed by the adult, as compared with the growing animal—especially the small animal. On the other hand phosphorus deficiencies occur in young animals and in such cases an increased intake of phosphorus is often necessary.

The metabolism of calcium and phosphate ions is intimately interrelated and liberal amounts of each are necessary for the proper functioning of the various metabolic processes of the body.

Calcium.—It is well known that calcium is the element most likely to be deficient in animal diets. It is an indispensable mineral, a constituent of all animal fluids and solid tissues and it plays an important role in a number of physiological processes and conditions. The most obvious of these are: (a) coagulation of blood, (b) formation of bone, (c) cardiac rhythm, (d) maintenance of normal neuromuscular excitability, (e) milk production, (f) membrane permeability.[1]

Bone is a living tissue, highly susceptible to nutritional disturbances during the earlier periods of growth. Nevertheless, even in adult life an inadequate supply of calcium, phoshorus and vitamin D may cause metabolic disturbances which may lead to bone weakness and deformities.

Requirements of Calcium and Phosphorus

It is impossible to state definitely the mineral requirements of calcium and phosphorus for an individual animal at any particular time. The optimal intake varies with the needs for growth and with the supply of vitamin D. A diet or ration that gives a strongly positive balance at one time may show little retention of calcium at another. Therefore, it is wise to supply enough calcium, phosphorus and vitamin D in the diet to insure normal growth and maintain the bony structures at all periods of life.

The normal development of the bone structures of the fetus is directly dependent on the nutrition of the mother during pregnancy. The maternal diet is likewise important for the proper development and well-being of the nursing animal.

During all stages of life the nutritional state depends on food ingested. Under ordinary circumstances the supply of phosphorus may be adequate. Calcium and vitamin D, however, are more apt to be ingested in insufficient amounts. There is little danger of giving too much calcium as long as some judgment is exercised, for the excess will be eliminated after the storehouse in the trabeculae of the bones is well filled. Similarly, the amount of vitamin D to be derived from the diet, from ordinary doses of cod-liver oil or irradiated ergosteral, or from exposure of the body to direct sunshine, will, for all practical purposes, never be excessive. It is quite likely, however, that the supply may be insufficient in puppies and in pregnant and lactating females.

The administration of calcium, phosphorus and also vitamin D to animals on restricted diets in certain disease conditions may be indicated.

Vitamin D

This is an essential vitamin but is contained in appreciable amounts in only a few of the foods available to the average animal. Small amounts are present in eggs, sardines, tuna and salmon which are included in some of the small animal diets. Living plant tissue contains none. Some plant tissues when no longer living will, under the influence of sunlight, acquire some vitamin D potency. Properly cured hay, especially legume hay, contains a significant amount of this vitamin. Butter, contrary to the general conception, contains a very small amount of vitamin D.

Since the average diet furnishes so little of vitamin D, it is important to see that growing animals are supplied with supplements of this vitamin. Although the exact requirements of vitamin D have not been determined for mature or adult animals, undoubtedly it should be supplied to them also, especially in small animals, or any animals, not regularly exposed to direct sunlight.

Role of Vitamin D.—The role of vitamin D in the metabolism of calcium and phosphorus has not as yet, been fully established. It seems to be concerned chiefly with the absorption of these elements from the intestinal tract. In other words, vitamin D is believed to act by increasing the amounts of calcium and phosphorus available for the mineralization of bones and teeth. In a series of papers by Liu[2] it was reported that one of the first signs of deficiency of vitamin D is a decrease in the amount of calcium in the urine, followed by an increase of calcium in the feces which progresses with the deficiency until a negative calcium balance exists. The changes in phosphorus metabolism differ only in the fact that urinary excretion of phosphorus is increased. Of special interest is the fact that these changes can be reversed with very small doses of vitamin D.

Requirements of Vitamin D.—The requirement of vitamin D may be defined as the amount which, with ample intakes of calcium and phosphorous and a diet otherwise adequate, insures sufficient retention of calcium and phosphorus to permit a normal growth of bones and teeth and their maintenance during adult life.

The amount of vitamin D necessary varies with different individuals and different species. For many animals some vitamin D in addition to that ordinarily obtained by exposure to sunshine and that obtained from an average diet is necessary for the most efficient utilization of calcium and phosphorus. Just how much of this vitamin is necessary to maintain health we do not know, but it is clear that young and growing animals need a liberal supply. Mature animals possibly need but little, but the nutritional status even of some adult animals would be improved by more liberal quantities of vitamin D in their diet or rations.

Growing animals should be supplied with supplements containing vitamin D

Summary

It is not only necessary that the diet provide sufficient amounts of calcium and phosphorus, but it is also important that these factors be available in sufficient amounts so that they may be absorbed in correct proportions. It is further necessary that an adequate amount of vitamin D be available to facilitate absorption and utilization of calcium and phosphorus. It may be necessary in some animals to give supplements of calcium, phosphorus and vitamin D in order to insure proper functioning of the various metabolic processes of the body. Some cases of this category would include premature animals, rapidly growing animals, pregnant and lactating females, and individuals suffering from gastrointestinal disturbances. When a supplement is administered it should be one that has a balanced calcium-phosphorus ratio with an adequate amount of vitamin D. Furthermore, especially in small animals, the supplement should be easily administered and free from objectionable taste, in other words one that is miscible with food or milk.

For the above mentioned reasons this writer advocates the use of dicalcium phosphate combined with vitamin D, preferably in an emulsion form.

References

1. Bert, C. A., and Taylor, N. B., The Physiological Basis of Medical Practice, The Williams and Wilkins Co., Baltimore, 1943.

2. Liu, S. H., The role of vitamin D in calcium metabolism in osteomalacia. *Chinese Med. J.*, 57:101 (Feb.), 1940; Further studies on vitamin D action. *Chinese Med. J.*, 19:349 (March), 1940.

Collection of Specimens for Laboratory Examination

By Rosa Kubin* and Arthur E. Lager**
Waltham, Massachusetts

SOME veterinary practitioners have stated that they were at a loss as to the collection and type of sample to submit for laboratory examination. The clinical pathologist, on the other hand, often finds himself unable to assist the practitioner adequately in arriving at a correct diagnosis, because the samples submitted had not been properly collected nor were they rushed to the laboratory.

A complete history should always accompany the specimen. Samples which are submitted without such a history or special instructions receive only a routine examination and important pathological changes may escape attention. An adequate history, however, will often suggest to the examiner certain special tests, which will facilitate diagnosis greatly. Furthermore, proper evaluation of the laboratory findings is possible only in the light of clinical symptoms.

1. *Urine.*—A one morning specimen is preferable for examination because it is most highly concentrated. However, if morning urine cannot be obtained as in large animal cases, that fact should be mentioned. Indicate also whether or not the sample was obtained by catheterization. An ounce of urine should be sent.

The morphological and chemical urinary constituents undergo rapid decomposition necessitating the use of refrigeration or a preservative (a pinch of thymol per ounce of urine), if the samples are to be sent to the laboratory by mail or messenger. If a bacteriological examination is required the urine, of course, has to be collected under sterile conditions.

2. *Feces.*—Submit a small, representative sample—packed in a pill or ointment box to prevent dehydration. Carnivora should be on a meatless diet for 72 hours before collecting the sample if an occult blood determination is requested.

3. *Spinal Fluid.*—This examination must be performed within three hours after the spinal tap.

4. *Blood.*—Absolutely clean, dry vials or tubes should be used for blood collection. The anticoagulant must be added in the dry crystalline form, not in solution, to prevent dilution and hemolysis of the blood. Blood smears for differential and platelet counts as well as for blood protozoa should be prepared from fresh capillary blood either by the slide or coverslip method. (1) Blood for cultures should be drawn and collected under sterile conditions. Table I shows a partial list of the significant laboratory tests helpful for differential diagnosis.

5. *Poisonings.*—A few of the poisonings most frequently encountered in veterinary practice are listed in Table II.

Blood should be drawn under sterile conditions and in dry, sterile container containing the anticoagulant in crystalline form

Summarizing, emphasis is placed on the collection of the sample at the right time and in the proper way, its rapid transportation to the laboratory to prevent decomposition, together with a complete history (species, breed, sex, age, anamnesis, symptoms, and previous medication). It is hoped the veterinarian will keep Tables I and II in his office for future reference. We believe he will find them useful in deciding upon the type of blood examination he desires and also the routine to follow in collection of the sample.

Reference

1. Todd, J. C., and Sanford, A. H. Clinical diagnosis by laboratory methods, 10th Ed., W. B. Saunders Co., Philadelphia, 1943, pp. 63, 230 and 249.

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TABLE I.—LABORATORY TESTS HELPFUL IN DIAGNOSIS

Type of Examination	Material and Amount Required	Anticoagulant	Remarks
Routine Morphological Exam. (hemoglobin, red cell count, white cell count, and hematocrit)	5cc of whole blood	6mg ammonium oxalate plus 4mg potassium oxalate* or 10mg sodium citrate	Also submit smears prepared from fresh blood for differential examination
Sedimentation Rate	5cc of whole blood	6mg ammonium oxalate plus 4mg potassium oxalate* or 10mg sodium citrate	
Platelet Count (purpura hemorrhagica)	Blood smears prepared from fresh blood		
Prothrombin Time (sweet clover poisoning)	4.5cc exactly of whole blood	0.5cc of 1.34% solution of sodium oxalate	Place the anticoagulant in clean, dry syringe first, then draw blood
Agglutination Tests (leptospirosis, brucellosis, pullorum and erysipelas)	Serum (10cc whole blood)	No anticoagulant	
Blood protozoa (anaplasmosis, piroplasmoses, trypanasomiasis and others)	Blood smears prepared from fresh blood		
Filariasis	5cc of whole blood	10mg sodium citrate or 10mg sodium oxalate	Ship in ice. Also submit thick smears prepared from fresh blood
Glucose (diabetes mellitus, convulsions)	5cc of whole blood	10mg sodium citrate or 10mg sodium oxalate	Blood must be taken after 12-hour fast
Albumen-Globulin Ratio (in kidney and liver diseases)	Plasma (10cc of whole blood)	10mg sodium citrate	
Uric Acid (gout, chronic lead poisoning)	5cc of whole blood	10mg sodium citrate or 10mg sodium oxalate	
N.P.N., Urea (nephritis, some nephroses and shock)	5cc of whole blood	10mg sodium citrate or 10mg sodium oxalate	
Icteric Index, van den Bergh (extra and intrahepatic obstructions, jaundice)	Serum (10cc of whole blood)	No anticoagulant	
Blood Calcium (tetany, vit. D deficiency, osteomalacia)	Serum (10cc of whole blood)	No anticoagulant	
Blood Phosphorus (rickets, osteomalacia, frequent fractures)	Serum (10cc of whole blood)	No anticoagulant	
Blood Phosphatase (rickets, osteoblastic tumors)	Serum (10cc of whole blood)	No anticoagulant	

TABLE II.—SAMPLES TO SUBMIT IN SUSPECTED POISONING

Type of Poisoning	Material and Amount Required	Remarks
Phosphorus	5cc whole blood (10mg sodium citrate) or 200cc of urine	Smear prepared from fresh blood for basophilic stippling
Arsenic Poisoning	200cc of urine	
Phenol, Carbolic Acid	200cc of urine	
Mercury	100cc of urine or 100gm of gastric contents	10cc whole blood (chlorides) No anticoagulant
Phosphorus	Fecal sample	

*The technic used in preparing vials with the proper amount of anticoagulant is as follows: 0.5cc of a 1.2% solution of ammonium oxalate and 0.5cc of a 0.8% solution of potassium oxalate are pipetted into the vial or test tube and the water is evaporated to dryness in an oven.

Evidence of an Anti-Vitamin Factor in Raw Mutton and Chevon

By R. D. RADELEFF
Kerrville, Texas

THIS is merely a case report and covers no extensive work on the subject, but the evidence presented by this case should form an interesting parallel to the work of Smith[1] and Putney and Goodlow.[2]

A female Border Collie, 14 months of age and weighing 35 pounds, was presented for treatment February 12, 1945, with obvious paralysis of the posterior limbs.

The history included an attack of canine distemper complicated by bilateral lobar pneumonia two months previously with apparent complete recovery. The diet had consisted entirely of raw mutton and chevon. The dog had become incapacitated in less than eight hours after the onset of initial symptoms.

There was incoördination of all muscle groups of the body, with spastic paralysis of the hind quarters. Attempts to obey a command might result in anything such as rolling nystagmus, a swinging of the head, or a baring of the teeth. The dog could rise on its forelegs only with difficulty.

The temperature, respiration and pulse were normal. An accumulation of nasal debris about the nostrils was due to the inability to remove the secretion with the tongue. The appetite was unimpaired although mastication and deglutition were impaired.

A provisional diagnosis of ascending paralysis due to meningeal hyperemia or infection was made, although the absence of an abnormal temperature made the latter cause improbable. An extremely cautious prognosis was given.

One hundred milligrams of thiamin hydrochloride were given subcutaneously the first day and repeated on alternate days. Twenty cubic centimeters of 50% dextrose solution was given daily. On the chance that there might be a demyelinization of the nerve fibers of the spinal cord, 100 milligrams ascorbic acid (cevalin, Lilly) were given daily for four days. Against the possibility of a latent meningeal infection 25 grains of sulfamerazine and 15 grains of sulfapyridine were given the first day with a 20% reduction daily thereafter. In addition, one ounce of vitamin B complex elixir (Abbott) was given daily. The diet was changed to the regular hospital commercial feed.

The condition of the dog became progressively worse until on February 19 she could move only a few inches by scrambling. Repeated thorough examinations revealed no clue as to what might be the source of the trouble. When I was about to concede defeat, the work of the authors referred to came to my attention. Since I had used vitamin therapy only during the first week I felt that now it might pay to repeat it.

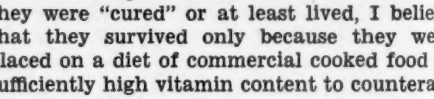
Beginning March 5, two ounces of vitamin B complex syrup (Abbott) were given daily. On March 7 the dog was again able to stand on her front legs. Full recovery was thereafter rapid and uneventful. After two weeks the syrup was discontinued and the patient held for observation against a probable relapse. However, no relapse occurred and the animal was discharged April 30 fully recovered. She was returned to the ranch and resumed her duties as a horse wrangler.

To me this case indicates the probability that there is some factor in certain raw meats which, if consumed by a dog, destroys or inhibits the action of some or all of the fractions of the B complex. I have seen other such cases, all in stock dogs—that is, ranch dogs—maintained upon a diet of raw meat. While they were "cured" or at least lived, I believe that they survived only because they were placed on a diet of commercial cooked food of sufficiently high vitamin content to counteract the effect of the anti-vitamin factor retained from the meat diet.

As stated in the beginning, this one case proves nothing, but perhaps others may see similar cases and have similar results in treating them. An accummulation of clincial observations of this phenomenon would have distinct value.

Two essentials for the successful handling of such cases then would seem to be the elimination of raw meat in the diet and supplying a supplement of factors of the vitamin B complex.

From the client's standpoint it is well to remember that cooking food destroys much of its vitamin content, making it necessary to supplement the diet.



[1] Smith, Susan Gower, *Science*, 100:2600.
[2] Putney, Lt. Wm. W., USMCR, *J.A.V.M.A.*, 106:819, pp. 164-165, 1945.

Clinical Reports

Cystic Calculus in a Young Bitch

January 5th a black cocker bitch, aged six months was presented at the hospital for treatment. She had a history of having had a hematuria of several weeks and a diarrhea for about one week. She was hospitalized and treated with sodium acid phosphate, grains 10, and novoxil capsules. Eight days later the bitch was discharged, apparently recovered.

February 10th she was returned to the hospital with a recurrence of the symptoms. Sodium acid phosphate was again prescribed and was supplemented with sanmetto and potassium citrate. The owner wished to have the animal spayed if possible and as she again appeared in good health on February 16th the operation was performed. While the peritoneal cavity was open it was decided to determine the condition of the bladder by palpation. To our amazement a single calculus was felt which was about the size of a small walnut. It was removed at once and the animal made an uneventful recovery.

Although a complete chemical analysis of the calculus was not done it was believed to have been composed mainly of oxalates as it conformed to the general description of oxalate stones.

This case is unusual as, to the best of my knowledge, cystic calculi have not been reported, heretofore, in a dog so young. This is the reason that a calculus was not even suspected, when the animal was first examined and treated.

OSCAR L. BOYD
University of Pennsylvania, Small Animal Hospital, Philadelphia

Swine Anesthesia

For some time I have been reading about nembutal anesthesia in swine. In every case the nembutal was given intravenously, usually in the ear vein. I have tried this method with good results; however, giving intravenous administrations via the ear vein always entails snubbing the pig to a post, applying a tourniquet to the base of the ear, and finally finding the vein and making the intravenous injection; all in all a time-consuming procedure.

In striving for a more easy, and still a practicable and sure method of swine anesthesia, I tried intraperitoneal injections with nembutal. The results were uncertain due to my needle piercing the bladder in some cases.

However, in recent swine operations, hernias and boar castrations, I have tried intramuscular injections of nembutal, using 1cc for every five pounds of body weight in small pigs and 1cc for every six to seven pounds in larger pigs with consistently good results. Anesthesia is complete in 10 to 15 minutes.

This method proves very helpful in operations on young pigs. Recently I was called to operate on three umbilical hernias in eight-week-old pigs and I used this method with excellent results. The farmer was extremely well impressed as the pigs quietly succumbed to the nembutal and the operations were completed without one squeal. Such humane work commands a higher fee, and does more for the profession than operating without an anesthetic.

HARVEY G. TABLEMAN
Warren, Ill.

Vitamin A in the Treatment of Acetonemia

I see 40 to 50 cases of acetonemia a year. In this section most cases occur from January to April. It is more common in Jerseys than in other breeds and most common in the heaviest producers. In the past I have been treating these cases with dextrose with fair to good results. Recently I have been using vitamin A somewhat; mostly in conjunction with dextrose. My treatment has been improved by the addition of the vitamin. In the last half dozen cases I have used vitamin A alone. The following are typical for such cases and the results obtained with this treatment:

Case No. 1.—This was a five-year-old Jersey with a calf two weeks of age. She had been sick 48 hours; was not eating; had an arched back, stiff gait, staring eyes and the characteristic odor on the breath. No urine test for ketones was made, since the trouble was unmistakably acetonemia.

Vitamin A, 250,000 I.U., was administered in the evening and the same amount the next morning. By the following evening, i.e., in 24 hours, the cow had fully recovered.

Case No. 2.—This was a grade Jersey cow with a calf six weeks of age.

The symptoms were the same as those in Case No. 1, and in addition this cow was walking in circles. The diagnosis was acetonemia.

This cow was given 250,000 units of vitamin A in the forenoon and an additional 250,000 units in the evening about 10 hours later. At that time she had improved 50%. By evening of the second day she had fully recovered.

B. H. SISK
Lawrenceville, Ill.

Lymphocytoma in a 15-Month-Old Dalmatian Bitch

A 15-month-old Dalmation bitch with a history of poor appetite, gradual loss of condition over the past two months, drinking an excess of water, having diarrhea, and being treated for tapeworms was brought to the clinic.

A mass was palpated in the intestine, posterior to the costal arch. It felt to be about one by two inches in dimensions, and was thought to be an intestinal obstruction. The temperature was 102.2° F.

LYMPHOCYTOMA
1. Ileo-cecal mass
2. Mesentaric involvement
3. Pancreas
4. Liver
5. Kidney
6. Cecum

The dog was given two ounces of bismuth subnitrate in mineral oil *per os*. After two hours a fluoroscopic examination revealed that the bismuth had passed through the stomach, but was stopped by an obstruction in the small intestine.

Preparations were made for a laparatomy by administering 40cc of normal canine serum and 250cc of normal saline solution intravenously and 1cc of metrazol subcutaneously. The dog was confined in dorsal recumbency and the abdomen shaved. The area was cleaned with soap and warm water, alcoholic sublimate, tincture of iodine and finally an alcoholic sublimate pack was applied while ether anesthesia was being induced.

A three-inch, mid-line incision, through to the peritoneal cavity, was made extending posteriorly from a point one inch posterior to the umbilicus. This revealed a mass of new growth which resisted attempts to lift it out of the cavity because of adhesions. The abdominal incision was lengthened and the mass found to be extensive neoplastic tissue. Euthanasia was performed.

The post-mortem findings were as follows: The omentum was attached to the abdominal wall from the urachus to the diaphragm. The main mass was three inches long and three-fourths of an inch wide involving the jejunum, ileum, cecum, and extending to the pancreas. It was firmly attached around the posterior vena cava, portal vein, the right kidney and forward to the diaphragm. The pancreas was enlarged but no neoplastic tissue could be demonstrated in it. The kidneys appeared normal. The liver was enlarged and firm. The mass appeared to have its origin from the portal lymph glands. The lumbar, mesenteric, and cecocolon lymph glands were also involved.

Microscopic examination of the mass showed it to be lymphoid tissue. A post-mortem diagnosis of lymphocytoma was made.

MANFORD E. MANSFIELD

Rockwell City, Iowa

Cochliomyia Americana Infection of the Upper Eyelid

A six-year-old, buckskin saddle horse had been shipped from Texas to Kansas with a carload of cattle, being in transit four days. When the horse was removed from the car the right eye was closed due to a severe swelling and there was a wound just above the eyelid. The next afternoon screwworms were noticed in the wound and the owner brought the animal for treatment.

The eyelids and surrounding tissue were severely swollen and numerous screwworms could be seen in the wound. The laceration was located latero-ventrally to the supra-orbital process and approximately ⅜ of an inch dorsal to the eyelid. A yellow, blood-tinged exudate was exuding from the wound. A purulent conjunctivitis was also present.

A chloroform swab was used to remove as many of the screwworms as possible and a pair of small hemostats were used in removing those in the deeper tissue. The wound cavity extended over the supraorbital process, upon the frontal bone and down to the conjunctiva.

Because of the small external opening of the wound not all of the screwworms could be removed at the first treatment and the following morning a large number were removed, with the aid of small hemostats. That afternoon hotpacks were applied to the eye and many more screwworms migrated to the wound surface where they could be removed easily. At this time there was a noticeable decrease in swelling. Hotpacks were again applied to the swollen area the next day but there was no evidence of screwworms, Argyrol was placed in the eye to reduce the purulent conjunctivitis and hotpacks were applied for 45 minutes daily during the next three days. By this time the swelling was almost absent and only a small wound remained, which was rapidly filling in with granulation tissue. Recovery was prompt and complete.

ALVA C. KELMAN

Arlington, Kan.

Cesarean Section in a Heifer with Torsion of the Uterus

History.—April 20, 1945, a two-year-old Hereford heifer weighing eight hundred pounds, which one week earlier had shown signs of approaching labor was brought for treatment. There had been faint expulsive efforts, but at no time had the labor been marked, nor had powerful abdominal contractions been observed. Other signs of the impending parturition were relaxed sacro-sciatic ligaments, edematous vulva with enlarged, soft, yielding labiae; and milk in the udder.

Diagnosis.—Upon examination the following conditions were found: Temperature 102.4° F. and appetite good, with vulva no longer having the appearance of beginning parturition but decreased in size and elasticity. The udder was inactive. The sacro-sciatic ligaments were hard and non-elastic. The hand could be passed through the birth canal with difficulty. Manual examination disclosed a torsion of the uterus through approximately 135 degrees to the right. The diagnosis was torsion of the uterus and cesarean section was indicated to relieve the dystocia.

Treatment.—The heifer was given 15cc of 2% procaine hydrochloride epidurally.

The emphysematous fetus and the necrotic placenta were removed by laparotomy. The uterus was irrigated with physiological saline solution and a generous amount of surgical sulfanilamide placed in it.

Immediately following the operation 500cc of 25% dextrose solution and 500cc of physiological saline solution were administered intravenously.

The heifer received one ounce of sulfanilamide *per os* daily for four days following the operation. The fifth day she received one ounce of U. S. tonic to stimulate the appetite.

Recovery was uneventful.

ARTHUR R. ROSEBERG

Novato, Calif.

Failure of Testosterone in a Cryptorchid Dog

This was a case of a black, male cocker spaniel three months of age, in good physical condition, but the right testicle had not descended into the scrotum. The left testicle of normal size was in the scrotum. There was no evidence of the right testicle being in the scrotum, under the skin of the flank, along side of the penis nor in the area of the external inguinal ring so this was probably a true case of abdominal cryptorchidy.

The owner desired to keep the dog for breeding purposes, and wanted any possible treatment employed, notwithstanding he was told the condition tended to be heritable.

The dog was treated for 60 days as follows: Every other day the animal was given an intermuscular injection of 3mg of testosterone propionate in 0.3cc of peanut oil solution.

There was still no evidence of descent of the retained testicle after two months' treatment. During the last month of the injections the dog exhibited a slight sexual stimulation a few hours after each treatment. However, the treatment was considered a complete failure in this particular case and was given up after a fair trial.

G. A. MULLEN

Coffeyville, Kan.

Teratoma of the Testicle in the Horse

April 25, 1945, a three-year-old, 1500-pound, Belgian cryptorchid was presented at the clinic for surgical removal of the retained testicle.

One and one-half ounces of chloral hydrate was given *via* the stomach tube to quiet the animal. The horse was cast and the inguinal region was cleansed with a 1 to 1000 alcoholic sublimate solution. The area was then swabbed with tincture of iodine. An incision was made over the left inguinal ring. The external inguinal ring was opened and a search was made for the testicle in the inguinal canal but to no avail. Incased in a sterile glove, the hand was inserted through the internal inguinal ring and peritoneum into the abdominal cavity. After some search a greatly enlarged testicle was discovered. Since it was too large to with-

draw without great damage to the region, a laporotomy was decided upon.

April 26 an area 8 inches wide and 16 inches long extending from the area of the paralumbar fossa to the flank was shaved. General anesthesia was induced by 1000cc of a

Enlarged, affected testicle—the size is shown in inches

12% chloral hydrate and 7% magnesium sulfate solution given intravenously. The area of operation was cleansed with a 1 to 1000 alcoholic sublimate solution and then swabbed with tincture of iodine. A sterile sheet was put over the operative area and an incision made in the sheet to correspond to the incision to be made in the skin.

The skin incision extended from the paralumbar fossa to near the flank. Using sterile gloves, the muscles were separated until the peritoneum was reached. It was broken and a gloved hand was inserted into the abdominal cavity. The much enlarged testicle was located and pulled through the incision. The cord was ligated with No. 4, 20-day, chromic catgut. The testicle was removed with an emasculator. The peritoneum was closed by interrupted sutures with No. 4, 20-day, chromic catgut. The muscles were drawn together by continuous sutures of the same material. The skin incision was closed with mattress sutures, using umbilical tape.

The testicle measured 10 by 8 by 6 inches; 22 inches in circumference at the cord and 26 inches around the largest part. It weighed 4,300 grams or approximately 9.5 pounds. The testicle was incised and determined to be a teratoma. Macroscopically cartilaginous, fatty and testicular tissues could be recognized.

Aftercare consisted of a transfusion of 2000cc of whole blood April 28. Also 100,000 oxford units of penicillin was given into the pectoral muscles. The animal received a second injection of 100,000 units of penicillin intramuscularly the following day. April 30 it received three doses of 480 grains each of sulfanilamide orally and May 1, 480 grains of sulfanilamide in the morning and 240 grains in the afternoon and again that evening, and a second transfusion of 1000cc of whole blood. May 2, 3 and 4, three 240-grain capsules of sulfanilamide were given, one in the morning, one at noon and the third in the evening. May 5 the stitches were removed. The horse was discharged from the hospital on May 10, in good physical condition.

DELBERT D. CLARK

Wheaton, Kan.

Swine Intestinal Anastomosis

An indication for intestinal anastomosis developed when an owner attempted to castrate a 30-pound, twelve-week-old, Chester white pig. Upon making an incision over what he thought was the left testicle, a loop of the small intestine appeared. The owner immediately brought the animal to the hospital. Examination revealed that the pig had a scrotal hernia through the left inguinal canal.

The animal was placed in dorsal recumbency on the operating table. The operative area was shaved and cleansed thoroughly with a 1 to 1000 alcoholic sublimate solution in preparation for a reduction of the hernia. A series of 2% procaine hydrochloride injections using about 30cc was made over and around the operative area to anesthetize the skin and subcutaneous tissues. A three-inch, longitudinal incision was made over the inguinal canal and the discovery made that the loop of intestine was firmly adherent to the scrotal tunics. The adhesions were broken down and the loop of intestine was retracted through the incision. An examination showed lacerations in three places, damaging about 10 inches of the intestine necessitating removal of the damaged section.

The loop of intestine was bathed with physiological saline in preparation for an end to end anastomosis. A pair of Rochester-Pean's curved forceps were placed on healthy tissue on each side of the damaged portion. The vessels supplying blood to this portion were ligated and severed. Then the damaged section was

severed close to the forceps. The severed ends of the intestine were brought together and connected by a series of six interrupted sutures using single No. 0 catgut in an atraumatic needle. Then a series of continuous Lembert-Czerny sutures followed on the outside of the six interrupted sutures around the circumference of the intestine and the anastomosis was completed.

The forceps were removed and the organ bathed with physiological saline solution. The spermatic cord was ligated and the peripheral end along with the testicle was removed through the incision in the scrotum. The central end of the cord was returned with the loop of the intestine into the abdominal cavity through the internal inguinal ring. About one ounce of surgical sulfanilamide powder was poured through the internal ring into the abdominal cavity and then the ring was sutured with surgical tape. The incision over the inguinal canal was then closed with a continuous suture using surgical tape. The pig was hospitalized for four days during which it was fed only liquid food; then sent home. Two weeks later the owner reported that the pig had made an uneventful recovery.

This operation was performed as a favor for the owner. As a practical consideration the value of the animal was not greater than the cost of the material used in the operation and the after care. But, it is often a good practice to do favors for one's clients.

L. A. LATHAM

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Fracture of the Mandible in a Dog

An owner who reported that the pup had been kept in a garage with a goat and that that afternoon was found with the lower jaw hanging, dried blood in nostrils and mouth and showing great pain, on March 29, 1945, brought in this five-and-one-half-months-old red cocker spaniel to be examined.

Examination disclosed congestion of mucous membranes, the left side of head swollen, dyspnea, slight epistaxis and hemorrhage of the mucous membrane of the left eye. Palpation revealed a fracture of both rami of the mandible and a probable fracture of the skull. The remainder of the body seemed normal. The outcome was considered very doubtful. A guarded prognosis was given.

The dried blood was removed from the face, nostrils and muzzle with cool water. The mouth was then swabbed with a 1% sodium perborate solution and pykotannin ointment was applied to both eyes which appeared dry over the cornea. A leather halter, made of scrap leather to lace tightly over the muzzle and tie behind the ears, was applied after the mandible had been pulled forward, locking the canine teeth. The dog was then put into a cage.

Seven or eight hours later 100cc of 5% dextrose in physiological saline solution was given subcutaneously in the region of the neck and thorax.

The next afternoon the halter was removed and cleaned. The dog was cleaned also and the mouth swabbed with 1% of sodium perborate solution. The ointment was again applied to both eyes. Four ounces of cows milk, one dram cod liver oil and one ounce lime water were given by means of a stomach tube. The breath had acquired a putrid odor, otherwise there was little change in the animal.

The following day two radiographs were taken, one dorso-ventrally and one tangentially. These disclosed complete verticle fracture of the left ramus and complete longitudinal fracture of the right ramus posterior to last molar tooth. Both palatine bones forming the hard palate were broken transversely anterior to the anterior palatine foramen. Fracture of the nasal bone at upper extremity was also certain. It was not certain if the frontolacrimal symphysis was broken.

The mouth was swabbed with a 1% sodium perborate solution. Three ounces of meat broth and one ounce of lime water were given *via* the stomach tube and adjustments were made in the fit of the halter. Blood tinged putrid fluid was still oozing from both nostrils. Two drops of menthol eucalyptol nose drops were put into each nostril. A low enema, which disclosed slight constipation, was given. Late the same day one ounce of lime water, two ounces of milk and one ounce of water were given by stomach tube.

April 1 the dog seemed about the same. The putrid discharge from the nostrils continued. One ounce of lime water, four ounces of milk and one dram of cod liver oil were given by stomach tube and that afternoon the dog was fed four ounces of milk, one raw egg in the same way.

The next day the dog was found dead.

The necropsy showed that the palatine bones and both rami of the mandible, as indicated by the x-ray, were fractured. In addition the frontolacrimal symphysis was fractured. The two nasal bones at their symphysis with frontal bones were pushed up and backwards. Union of the bones had not had time to occur.

Conclusion.—Death of the dog was caused by necrosis of nasal turbinates and hemorrhage.

Kansas City, Kan.

M. J. STIEFEL

Book Reviews

The Artificial Insemination of Farm Animals. By *Enos J. Perry*, Editor, Extension Professor of Dairy Husbandry, Rutgers University; *John W. Bartlett*, Professor of Dairy Husbandry, Rutgers University; *George E. Taylor*, Extension Professor Dairy Husbandry, Rutgers University; *Joseph Edwards*, Cambridge University; *Clair E. Terrill*, Animal Husbandman, United States Sheep Experiment Station and Western Sheep Breeding Laboratory, Dubois, Idaho; *Victor Berliner*, Professor of Animal Husbandry, Mississippi State College of Agriculture, and *Fred P. Jeffrey*, Professor of Poultry Husbandry, Massachusetts State College. 265 pages, 47 illustrations and many tables. Published by the Rutgers University Press, New Brunswick, N. J., 1945. Price $3.50.

Although this work was written for Agricultural Extension employees, artificial insemination technicians and livestock breeders, veterinarians will find it a most useful text, bringing together as it does an authoritative discussion of the whole subject of artificial insemination of animals in a single volume. Probably all the information it contains has appeared in veterinary or allied literature in the past decade, but it is well worth while to have it collected thus and presented in orderly arrangement in a single volume.

The United States has lagged materially behind other leading livestock countries in the practice of artificial insemination of domestic animals. As an industry, this method of breeding in this country, is only seven years old. Veterinarians have practiced artificial insemination in a limited way, particularly in the breeding of horses for four decades and certain large cattle ranches have practiced it for more than half that period, but it was not until 1938 that the first association in this country—Cooperative Artificial Breeding Association No. 1, Inc.—began operation with 102 members and 1,050 cows. This was in New Jersey. In six years the plan had been extended to include 14 thousand cows in that state and in all the states to 96 associations or "breeding rings" with a membership of 28,627 dairymen who owned 218,070 cows. In addition a considerable number, most of them veterinarians, were carrying on the work as individual or partnership enterprises. When this record is contrasted with the slow progress that has been made by the officially sponsored Cooperative Bull Associations it is even more astonishing.

The text includes a discussion of: (1) organs of reproduction (very elementary), (2) procedures (given in detail for each species of farm animals), (3) breeding better livestock (a brief but adequate discussion of genetics), (4) system of breeding, (5) selection of sires, (6) cooperative artificial breeding associations (problems of organizing, financing, management and operation), (7) shipping of semen, (8) feeding and management of sires, and (9) disease in relation to artificial insemination.

A fault of the text is the failure of the authors to appreciate the value of veterinary service to an association in improving the reproductive health of the animals through examination, advice and supervision or in improving the ratio of conceptions to inseminations, the conception rate, by early cure or elimination of infertile cows. We think a prize for naiveté is merited for the following: "It is most essential, therefore, that all males used for artificial breeding purposes be carefully tested and checked by a competent veterinarian, or someone equally well qualified to check for and recognize the symptoms of transmissible disease."

* * * *

Medical Uses of Soap: A Symposium. By *G. Thomas Halberstadt*, Ch.E. and eight collaborators. Edited by *Morris Fishbein*, M.D., Editor of Journal of the American Medical Association. 181 pages; 41 illustrations. Published by J. B. Lippincott Co., Philadelphia. 1945. Price $3.00.

This is a collection of uniformly excellent articles which tell the story of soap—its use and abuse, its chemistry and manufacture, its effects on normal and diseased skin, on the hair, for shaving, in industry—indeed the material goes well beyond the confines "Medical Uses of Soap." The symposium presents the views and experiences of men in the varied fields of dermatology, chemistry, bacteriology and industrial medicine; a practical consideration of the subject.

In industry, business, our personal lives and our professional work we are constantly using cleansing agents, the chief of which is soap, to remove visible and invisible dirt—including bacteria. The use of soap creates problems: the choice of a soap suited to the purpose, the removal of protective substances from the skin along with the objectionable substances, irritation of the skin in special circumstances, the effect of unsaturated alkalis and free fatty acids in soap, etc. These problems receive extended discussion in this volume, some of which are applicable to only a very limited extent in veterinary medicine.

The opening chapter on soap technology considers the chemical and physical property of all types of soap: toilet bars, laundry soaps, household soaps, soap pastes, liquid soaps, and the new soapless detergents and wetting agents. General methods of manufacture also

are given. It is an interesting and valuable chapter.

Veterinarians will find many uses for the information included in this volume.

* * * *

Microbiology of Meats. By *L. B. Jensen*, A.B., M.Sc., Ph.D., chief bacteriologist, Swift and Company; formerly Assistant Professor of Experimental Bacteriology, Mayo Foundation, Instructor in Bacteriology University of Chicago, etc. Second edition, revised and enlarged. 369 pages; illustrated. Published by The Garrard Press, Champlain, Ill. 1945. Price $5.50.

In the review[1] of the first edition of this work in these columns, it was stated: "No veterinarian engaged in food inspection should fail to procure a copy of this book." That statement is equally applicable to the second edition in which the discussion has been extended approximately 50%, chiefly by new material on bacterial spores, beef dehydration, care of food in mess halls, smoking of meats, bacteriology of ice, the action of salt, nitrate and nitrite on bacteria and the control of bacteria.

The use of some of the standard processes of the present for preserving meat-refrigeration, salt curing, smoking and drying antedate recorded history, but it is only a little more than a score of years since bacteriological research came to the aid of the meat industry. This research has been strikingly fruitful and this volume is a record of that research and a summary of its results. It provides an unanswerable argument for the use for food of only healthy animals slaughtered and processed in sanitary surroundings and under hygienic conditions.

The author expresses his indebtedness to various members of the veterinary profession "whose long experience and research in this field have contributed in a large measure to the methods which safeguard and preserve food supplies of animal origin."

The discussions of food spoilage, food poisoning and post-mortem preservation of poultry quality are of particular interest to the food inspector. The whole volume is "must" reading for the state or municipal meat inspector.

[1] *Vet. Med.* 38:7, p. 279, 1943.

Any book reviewed in these pages, or any other book if available, may be obtained by remitting the published price to VETERINARY MEDICINE, 7632 S. Crandon Ave., Chicago 49. Bulletins and Circulars should be requested direct from the address given in the notice. Generally they are supplied free unless a price is stated.

Abstracts

Anesthesia of Short Duration

In small animal practice[75] pentothal sodium is an anesthetic agent of great safety. It is extremely useful in all surgical interferences of short duration and may be used in small animals with every confidence, provided the injection is made slowly in all cases, and the anesthesia is carefully assessed at each stage. The dose of pentothal sodium is estimated at a rate of approximately one-fourth grain per pound body weight.

* * * *

Six-Day Chicken Disease

Six-day chicken disease is due to a deficiency in available energy in all-mash chicken starter rations.[76] Several contributing factors are collectively responsible, namely; lack of whole grains and maize products, a deterioration in the composition of the nitrogen-free extractives of miller's by-products and the inferior quality of other cereal products permitted under wartime regulations for poultry feeding. Large quantities of palm kernel residues of any type are undesirable in baby chick rations since they are unpalatable and provide inadequate energy upon metabolism.

* * * *

Penicillin Successful in Various Ailments

The author[78] has used 50 million units of penicillin in his practice and concludes: (1) that it is "miraculously" effective in the treatment of sinus infection in cats, (2) the most successful medicament in the treatment of acute mastitis, (3) very beneficial in the treatment of retained placentae in cows, (4) that it shortens the duration of the attack in equine distemper, (5) gives gratifying results in the treatment of chronic mastitis and (6) is helpful in the treatment of fistula of the withers.

In the treatment of mastitis all milk is stripped from the affected udder and 25,000 units of penicillin infused and allowed to remain. The treatment is repeated 24 hours later. Even in toxic cases the appetite returned in 12 hours.

In treatment of cases of fistula of the withers (unopened) 200,000 units of pencillin was injected directly into and around the pus pocket with a long hypodermic needle.

In retained afterbirth a capsule containing 100,000 units was deposited in the uterus.

[75] Editorial; Pentothal sodium as an anaesthetic. *Vet. Rec.* 57:12, p. 134, 1945.—*A. H. Bryan.*

[76] Temperton, H., and Bythell, D. W. P. Six-day chick disease. *Vet. Rec.* 56:44, pp. 409-412, 1944.—*A. H. Bryan.*

[78] Roberts, Dan. A practitioner and penicillin. *The Tex. Vet. Bul.* 7:5, 1945.

Cattle Ticks in England

Eleven species of ixodid ticks are indigenous to Great Britain[76] and may infect cattle. The most important are: *Ixodes ricinus, I. hexagonus, Haemaphysalis cinnabarina* var. punctata, and the *ermacentor reticulatus. I. ricinus,* known under a variety of popular names such as "sheep tick," "castor-bean tick," "grass tick" or "heather tick" is the species which occurs most commonly and is of greatest economic importance in Britain. Dipping solutions normally used for sheep may be used for cattle ticks and fall into two classes: arsenical dips and derris dips. Arsenical dips, when diluted for use, should have strength equivalent to 0.2% As_2O_3; and derris dips should have a strength equivalent to one in 5,000 of derris resins.

Rabies Prophylaxis

Habel,[79] as a result of a large number of experiments with mice, guinea pigs and monkeys, recommends that persons in whom exposure to infection is suspected be given rabies immune rabbit serum immediately and the 14-injection vaccine prophylaxis be commenced six days later. Such treatment proved more effective after experimental exposure than either the vaccine or the serum treatment alone. It has the further advantage of allowing time for mouse inoculation test and thus establish or disprove the suspected exposure, thus avoiding the expense and annoyance of taking the vaccine treatment where there had been no real exposure to infection. The author believes that most of the 14-daily-dose treatments are given to persons who have not really been exposed to infection.

Penicillin for Food Preservation

In the pasteurization of milk and the non-pressure canning of fruits and vegetables, all vegetative forms of bacteria are usually killed. However, the residual bacterial contaminants, which usually consist solely of heat resistant spores, upon germination produce toxins and food spoilage.

In food products many of the chemical antiseptics are not feasible, so Curran and Evans,[80] of the of the U. S. Dept. of Agriculture, experimented with penicillin as a food preservative. When washed bacterial spores, had been suspended in milk or water and the suspension heated to 95° C. for 15 minutes, penicillin was added and the mixture incubated at the optimum temperature for germination. After five to 27 hours incubation the residual penicillin was inactivated by adding penicillinase.

The spore count was reduced from 256 *Bacillus subtilis* spores per cubic centimeter to 1.6 spores in five hours and to 0.04 in 27 hours. Five Oxford units of penicillin per cubic centimeter was used in the test. Because of its nontoxic nature and its effectiveness in low concentrations against bacterial spores, it is suggested by the authors that it be used in food preservation since presumably inexpensive, crude penicillin would be satisfactory.

Foot-and-Mouth Disease Vaccine Successful

An outbreak of foot-and-mouth disease occurred at Taranto, Italy, in May, 1944.[72] It brought many requests to the Army veterinary service from Italian veterinarians for a vaccine to immunize the more valuable breeding stock. A laboratory was rehabilitated in Rome to produce the vaccine. Thirty-six thousand doses of the vaccine were produced and used—15,000 doses in the vicinity of Rome. Although many of the vaccinated animals were in herds in which the disease had already appeared there was no case of the disease in a vaccinated animal more than two weeks after vaccination and very few cases occurred more than one week after vaccination.

Equine Encephalomyelitis of Virus Type

Randall[71] maintains that equine encephalomyelitis is the most important horse disease in the United States at the present time. The knowledge that the three types of equine encephalomyelitis enzootic in the Western Hemisphere (eastern, western and Venezuelan) are pathogenic for human beings and the relatively high mortality rate of the human disease emphasize their importance from the public health standpoint. The evidence is ample that the disease is transmitted through insects, particularly mosquitoes, and its control involves antimosquito measures. Horses and mules may be protected against the disease by the annual administration of chick tissue vaccines. A vaccine suitable for human use can be made available if indications for its use develop.

[76] Ministry of Agriculture; Report on diseases of farm livestock; parasitic diseases of cattle. *Vet. Rec.* 57:8, pp. 86-90, 1945.—*A. H. Bryan.*

[79] Habel, Karl. Seroprophylaxis in experimental rabies. *Pub. Hlth. Reprts.* 60:20, 1945.

[80] Curran, H. R., and Evans, F. R. *Proc. Soc. Exp. Biol. and Med.* 58, p. 262 (March), 1945.

[71] Randall, R., Equine encephalomyelitis of virus type. *Mil. Surgeon,* 96, p. 233 (March), 1945. Abst. *J. Am. Med. Assn.*

[72] Rushmore, V. C., Maj. Rowland W., Waldmann vaccine for foot-and-mouth disease in liberated Italy. *Bul. U. S. Army Med. Dept.* No. 89, pp. 94-97, 1945.